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and taxonomy of some Palaearctic species of
Tetramesa Walker (= *Isosoma* Walk.;
= *Harmolita* Motsch.) (HYMENOPTERA :
EURYTOMIDAE), with particular reference to
the British fauna 175-216, 1 plate,
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A CONTRIBUTION TO THE BIOLOGY AND TAXONOMY OF SOME
PALAEARCTIC SPECIES OF *TETRAMESA* WALKER (= *ISOSOMA* WALK. ;
= *HARMOLITA* MOTSCH.) (HYMENOPTERA: EURYTOMIDAE), WITH
PARTICULAR REFERENCE TO THE BRITISH FAUNA

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(With 1 Plate and 105 Text-figures)

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I. INTRODUCTION

THE genus *Isosoma* was erected by Walker (1832) to include the species of Eurytomidae with cylindrical abdomina and long slender bodies ("Abdomen cylindricum Corpus elongatum, gracile: . . ."). He originally included twenty-three species, the second of which, *Eurytoma longula* Dalman, was designated as type species by Westwood (1839). Unfortunately the generic name *Isosoma* is preoccupied and *Harmolita* Motschulsky (1863) has been in more or less general use for the same assemblage of species since about 1920. I have suggested (1958) that the name *Tetramesa* Walker (1848) should be considered as a synonym of *Isosoma* and thus take priority over *Harmolita*. As well as complying with the rules of zoological nomenclature, the name *Tetramesa* has a great advantage over *Harmolita* in that its type species, *T. crassicornis* (Walk.), can definitely be identified.

I have previously (*l.c.*) given generic synonymy and made a redescription of the genus, and more recently (1961) included it in a key to genera. *Tetramesa* is difficult to define exclusively, but can be characterised as follows:

Occipital carina absent; occiput not sharply delimited from gena, usually sculptured similarly; post-genal carina often slightly developed ventrally, but never formed into a lamella. Female antenna rarely with a well developed flagellar club; flagellum with five or six clearly separate segments before apical segment. Male flagellum of seven distinctly separate segments terminating in a short spine. Head and thorax variably sculptured, rarely with heavy umbilicate punctation. Marginal vein usually more than twice as long as stigmal vein. Female gaster usually elongate, often longer than thorax.

Larvae phytophagous in Gramineae.

Between 1832 and 1873 Walker described over forty Palaearctic species attributable to *Isosoma*, mostly from Britain. Boheman (1836) included five species which I now refer to *Tetramesa*. Thomson (1875) described only ten species, including the five of Boheman. Since these early descriptions, the only major works on the Palaearctic fauna have been those of Hedicke (1920, 1924). His studies were based mainly on the collection of German material bred from grass galls by von Schlechtendal, who himself (1891) had described the galls and coined binomials for ten of them. Hedicke (*l.c.*) took these names as *nomina nuda* and either validated them by describing the adult insects or recognised the synonymy but used new names. However, the rules of zoological nomenclature now validate a binomial assigned to the "work" of an animal even when unaccompanied by a description of the animal itself. This ruling (1957, *Bull. zool. Nomencl.* 14 : 53) was approved by the Colloquium on Zoological Nomenclature of the XVth International Congress of Zoology, London, 1958. Thus, the ten binomials coined by von Schlechtendal for species which I now attribute to *Tetramesa* are available names for those species. Stability of nomenclature can only be attained if valid lectotype selection can be made and it is difficult to see how this can be done when no insect was described. Logically the lectotypes of these species should be herbarium specimens! In the circumstances it is probably best to select neotypes for the species, if possible from von Schlechtendal's own material. Through the great kindness of Dr. G. Steinbach, I have been able to borrow the complete von Schlechtendal and Hedicke collections from the Zoologisches Museum, Berlin, and am here including type designations for all those species. In addition there are original specimens ("cotypes") of seven of the von Schlechtendal species now in the British Museum (Nat. Hist.).

Hedicke (*l.c.*) did not examine the Walker, Boheman or Thomson collections. However, for some of the Walker species there were specimens in the Cameron collection (Berlin). These are not the true types, but duplicates which had been sent to Cameron. Walker was in the habit of giving large numbers of specimens to other workers and retaining only very short series himself. For example, there are many of his specimens, very few of which are types, in the Dale collection at Oxford. Hedicke considered the Cameron specimens in Berlin as types, unless they would not fit the original description, when he usually described them as new! Thus, he failed to identify most of the Walker species and also erected further names based on quite inadequate material.

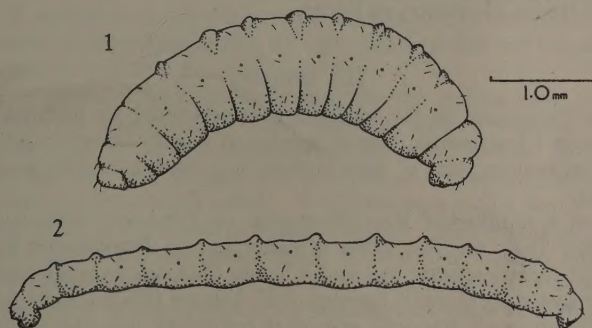
Several species attributed to *Isosoma* have been described from the Soviet Union, mostly attacking cereal crops (see Rimsky-Korsakov, 1914, 1923). However, the exact identities of these species are uncertain.

Work on the nearctic species of *Tetramesa* has been more intense and in some respects more satisfactory. A number of species are important pests of cereal crops in Canada and U.S.A. and thus have been widely investigated. Howard (1896) and later Phillips and his co-workers (1919, *etc.*) have published descriptions, biological data and keys to species. Much of the work was based on bred material and experimental breeding carried out on a large scale, so that most of their species are "good" ones. However, the descriptions and keys to adults (Phillips and Emery, 1919, 1936) are inadequate and based on variable characters (*e.g.* propodeal and petiolar sculpture).

I have commenced a study of the palaearctic species. This paper is mainly concerned with British forms, since it is only of these that I have been able to obtain adequate material. I am, however, including a number of Continental species, the type material of which I have been able to examine, but full descriptions of these are not given. My work has been based on series bred from larvae dissected from the host plants, and also on adult material carefully collected in the field. As a basis for the nomenclature I have been studying the Walker collection in the British Museum (Nat. Hist.), where as many names as possible have been identified with

syntypic material. After the validation of lectotype selections by publication, the nomenclature should have a more stable foundation. Many of the later names published by Walker are not included here, but most are synonyms of earlier ones. Those forms described by him from Madeira and other parts of Europe mostly seem to represent good species, but I have no modern material available for comparison.

Within the genus structural diversity is slight, so that species definition is difficult and small comparative characters have to be used in a key for specific determination. Such characters as the comparative measurements of antennal flagellar segments, so useful in many Chalcidoid groups, are only of limited value here, since there is usually a wide spread of intra-specific variation. It is rarely possible to determine very small specimens with certainty, and usually short series are required for accurate determinations. I have collected biological information on as many species as possible and it is obvious that host-plant specificity is extremely well developed. There are no species which have been reliably recorded as attacking species of more than one genus of grasses. The apparent extreme host specificity of the group is confirmed by the large scale breeding work of Phillips *et al.* (1919, *etc.*) with a number of Nearctic species. They found that although most species could be bred in the laboratory on their normal host plants, none could be made to oviposit in grass species not normally attacked in the field, even though they were attacked by closely similar forms.



FIGS. 1-2.—Last instar larva, lateral view, of: (1) *Tetramesa longicornis* (Walk); (2) *T. fulvicollis* (Walk).

There is no doubt that for most species, biological characters, including particularly host specificity and mode of larval life, are easier to appreciate than normal characters of adult anatomy. However, it is obviously most important that standard taxonomic methods should be employed so far as possible, though eventually groups of extreme sibling species, which cannot be separated with museum material alone, will have to be recognised.

I have attempted to find new morphological characters, without great success. At some points in the following key I have used the shape of the gaster, which is often quite characteristic. Unfortunately it is sometimes difficult to appreciate in dry mounts owing to differential shrinkage of the segments after death. However, I cannot support the view that the character is valueless, as implied by Bailey (1960). My key, given below, is to the known British species, modern material of which is available. Unless otherwise stated, characters, particularly of the antennae and gaster, apply only to females. Definite male characters are included at some points, but it will not normally be possible to identify specimens of this sex without associated

females. In view of the inherent difficulty of the genus the key should not be used in isolation, but only together with the individual descriptions.

II. TERMINOLOGY AND METHODS

The terminology of Richards (1956) has been followed for most morphological features, but the term thorax is used here to include the propodeum unless otherwise stated. The terms funicle and club are not used regularly in the nomenclature of the antennae, but the segments *after* the anellus are referred to collectively as the flagellum. Only clearly separate segments, as seen in a Canada Balsam mount, are recognised as true segments. I have previously discussed this problem (1959b) and the same descriptive methods are employed here. All morphological observations on adults have been made on dried specimens, usually mounted on card-points. However, the figures of antennae, legs and wings have been made from slide-mounts in Canada Balsam. Such mounts should not normally be necessary for identification. Names of British plants are taken from Clapham, Tutin and Warburg (1952). For Continental records quoted from the literature, the names used by the individual authors are given.

For brevity in the following descriptions, the British Museum (Natural History), London, will be referred to simply as the British Museum; the Naturhistoriska Riksmuseum, Stockholm, Sweden, as Stockholm; Universitetets Zoologiska Institution, Lund, Sweden, as Lund; and the Zoologisches Museum der Humboldt-Universität zu Berlin, Germany, as Berlin.

III. BIOLOGY

The genus *Tetramesa*, so far as known, is restricted to phytophagous species attacking grasses (Gramineae). Many species in North America and the U.S.S.R. are regarded as serious pests of cereal crops, but none have yet been recorded as such in Britain.

The eggs of a number of Nearctic species of *Tetramesa* have been figured by Phillips (1920). They are like those of other known Eurytomids in possessing a short process at the micropylar end and a longer filamentous process at the opposite end. Eggs dissected from adult females of *T. linearis* (Walk.) show a similar structure. The chorion in all described species is colourless, not darkly pigmented as it may be in many species of *Eurytoma*.

The final instar larvae of *Tetramesa* are also typical of the Eurytomidae, in that they are clothed with hairs, though usually very sparsely, and the mandibles are bidentate. The larvae are usually distinctly yellow coloured and normally cylindrical in shape (fig. 1). In some species, such as *T. petiolata* (Walk.) and *T. fulvicollis* (Walk.) (fig. 2), the larvae are very elongate and worm-like. This shape is correlated with the small diameter of the stems in which they live. Larvae of many *Eurytoma* species, including most of those associated with grasses, are whitish in colour, less cylindrical, tapering anteriorly and posteriorly, and often more thickly haired.

Most species of *Tetramesa* overwinter as last instar larvae within the dead host grass and pupate and emerge during the following spring, but three of the species investigated normally overwinter as mature pupae. These are *T. angustipennis* (Walk.) *T. eximia* (Giraud) and *T. brevicornis* (Walk.). The habit may enable these species to emerge earlier in the spring than otherwise would have been possible. This would certainly be an advantage to a species such as *T. angustipennis*, which attacks the early flowering grass, *Alopecurus pratensis* L. *T. eximia* is also exceptional in that normally it appears to take two years over its life cycle, at least in Britain. Several species certainly have at least two generations each year. These are species, such as *T. longicornis* (Walk.), which attack grasses with a long flowering period during the

summer. However, most species have only a single generation each year and are adults during spring and early summer.

The range of larval habit within *Tetramesa* is wide. Many species live in the central cavity above the nodes of the host-grass flowering stem. These, such as *T. fulvicollis* (Walk.), *T. longula* (Dalm.) and *T. petiolata* (Walk.), show no sign of their presence externally and their effect on the flowering head is usually slight. The remaining species of the genus form galls, often only slight stem swellings, in which the larva or larvae feed. However, the swellings are usually accompanied by a definite stunting of the flowering stem above the larval cells, which makes their presence obvious externally. Such galls usually do not prevent flowering, but reduce the productivity of the flowering head. A good example of such a species is *T. calamagrostidis* (v. Schlecht.) (fig. 5). *T. hyalipennis* (Walk.) produces such extreme stunting that the flowering stem rarely develops above the gall and the normal growth pattern is completely disrupted (figs. 3 and 4). The species of the *linearis* group are characteristic in that the larval cells are inside the actual stem wall or its surrounding leaf sheath (Plate I) and not within the central stem cavity as with most other species. The most important species from the economic point of view, such as *T. hordei* (Harris) and *T. tritici* (Fitch), belong to this group. When, as is usual in the *linearis* group, a number of larval cells are present, the flowering stem may be badly stunted and in extreme examples fail to produce flowers. Probably the most unusual species in larval habit are those which form galls on the grass flowers. There are three such species known from Central Europe—*T. stipae* (De Steffani), *T. cylindrica* (v. Schlecht.) and *T. scheppigi* (v. Schlecht.), all of which attack the flowers of *Stipa* species (fig. 8). No allied species are known to me from Britain, Scandinavia or North America.

Since the grass flora of the Palaearctic and Nearctic regions have many genera in common, it would be expected that there might be some *Tetramesa* species with a holarctic distribution. I have examined paratypes of several North American species and am satisfied that at least five of them are conspecific with Palaearctic ones. The synonymy is included below. As I have seen only a few Nearctic species it is likely that there is considerable faunal overlap. This seems to apply also to many of the parasites, e.g. *Eudecatoma mellea* (Curtis) (see Claridge, 1959a).

Detailed biological information will be given separately under each species and unless otherwise stated is based entirely on observations made in Britain.

IV. HOST PLANT LIST

Species of grasses and of *Tetramesa* not certainly recorded as native in Britain are indicated by an asterisk.

Gramineae

Tetramesa spp.

Agropyron junceiforme (A. and D. Löve) A. and D. Löve; *A. pungens* (Pers.) Roem. and Schult.; *A. repens* (L.) Beauv.
A. tauri Boiss. and Bal.*
Alopecurus geniculatus L.; *A. pratensis* L.

Arundo donax L.*
Brachypodium pinnatum (L.) Beauv.; *B. sylvaticum* (Huds.) Beauv.
Bromus commutatus Schrad.
Calamagrostis epigejos (L.) Roth.

Corynephorus canescens (L.) Beauv.
Dactylis glomerata L.
Deschampsia caespitosa (L.) Beauv.
Elymus arenarius L.
Festuca gigantea (L.) Vill.

T. cornuta (Walk.); *T. hyalipennis* (Walk.);
T. linearis (Walk.).

T. persica (Hed.)*
T. angustipennis (Walk.); *T. fumipennis* (Walk.).
T. romana (Walk.)*
T. fulvicollis (Walk.); *T. brachypodii* (v. Schlecht.)*
T. maculata (How.).
T. calamagrostidis (v. Schlecht.); *T. eximia* (Gir.).
T. schmidtii (Hed.)*
T. longula (Dalm.).
T. airae (v. Schlecht.); *T. petiolata* (Walk.).
T. brischkei (v. Schlecht.)*
T. giraudi (v. Schlecht.).

HOST PLANT LIST (cont.)

F. rubra L.; *F. ovina* agg.
Koeleria cristata Pers.; *K. glauca* D. C.*
Phalaris arundinacea L.
Phleum pratense L.
Poa nemoralis L.
Stipa capillata L.*

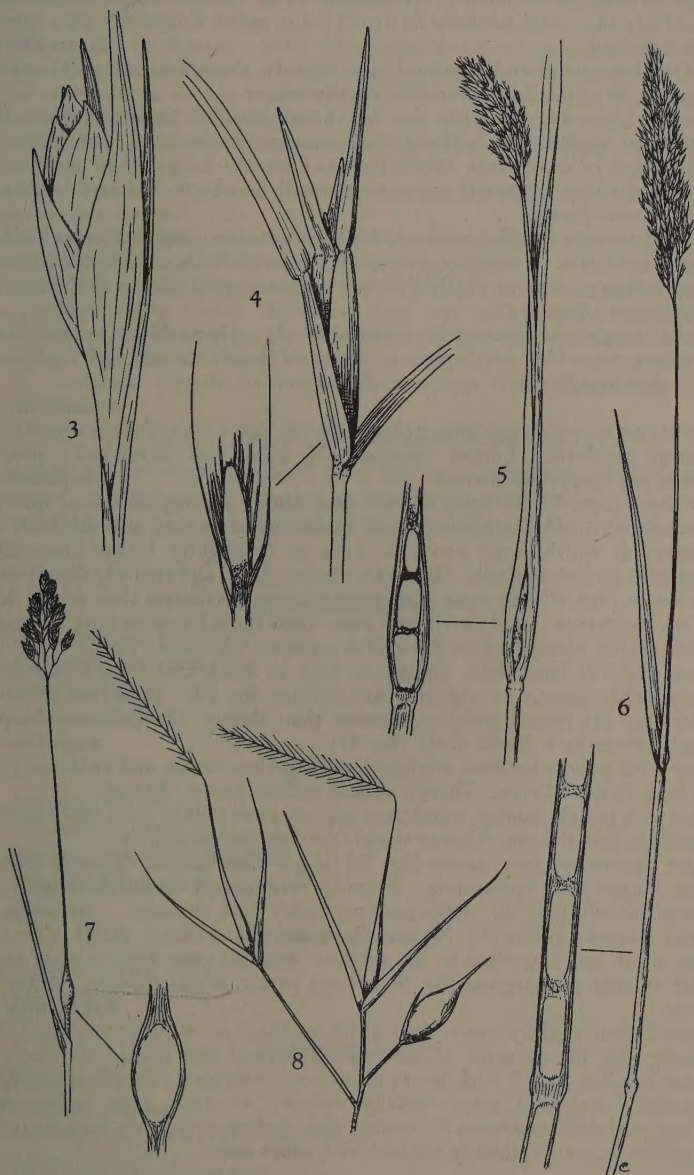
S. pennata L.*
S. tortilis De Steff.*

T. brevicornis (Walk.); *T. brevicollis* (Walk.).
T. schlechtendali (Hed.).*
T. longicornis (Walk.).
T. albomaculata (Ashm.); *T. phleicola* (Hed.).
T. poae (v. Schlecht.).*
T. aciculata (v. Schlecht.).*;
T. cylindrica (v. Schlecht.).*
T. scheppigi (v. Schlecht.).*
T. stipae (De Steff.).*

V. KEY TO THE BRITISH SPECIES OF *Tetramesa*

(based on females, with notes where possible on males)

- 1 Pronotum rugulose (or if smooth or doubtful, then third tergite short), often with distinct umbilicate punctures from which arise hairs. Thoracic hairs sometimes very long and thickly distributed 2
- Pronotum smooth with transverse lineolate reticulation or fine alutaceous surface sculpture, often giving highly polished effect. Thoracic hairs short and sparsely distributed 16
- 2 Head in frontal view (figs. 10, 16, 17, 19) with cheeks sharply angled; height of eyes about equal to or slightly less than malar space. Antennae (figs. 26, 27, 28) with at least six basal flagellar segments distinctly separate; no development of a club; flagellar segments heavily sculptured, with rhinaria short. Thoracic sculpture heavy with well developed umbilicate puncturation. Metanotum obscured in dorsal view by the backward projection of the scutellum (*angustipennis* group) 3
- Head in frontal view (figs. 32, 42, 44, 54, 63) with cheeks less sharply angled. If doubtful, sixth flagellar segment closely associated with seventh (*cf.* figs. 36, 37, 48-53) 5
- 3 Flagellar segments 4 to 6 distinctly transverse (fig. 28). Small stout species, maximum length about 2.8 mm. *filicornis* (Hedicke) (?)
- Flagellar segments 4 to 6 distinctly longer than wide; sixth occasionally almost quadrate. Larger more elongate species 4
- 4 Gaster (fig. 21) lanceolate, distinctly longer than head and thorax together; tergites 2 to 8 with distinct alutaceous sculpture extending dorsally; petiole very short, not forming a distinct dorsal tongue-like process. Legs in both sexes predominantly rufous *eximia* (Giraud)
- Gaster (fig. 22) distinctly shorter, about as long as head and thorax together; tergites 2 to 8 polished; petiole longer, forming a distinct anteriorly projecting tongue-like process dorsally. Legs extensively fuscous marked *angustipennis* (Walker)
- 5 Pedicel as long as or slightly longer than the first flagellar segment (without anellus) (figs. 36, 37). Third segment of gaster short and dorsally emarginate (figs. 34, 35). Head (fig. 31) distinctly gibbous between eyes, produced forward dorsally to antennal insertions. Pro- and mesonotum with rugulose, sometimes fine, sculpturation, but without scattered umbilicate punctures. Body narrow, gaster lanceolate (*linearis* group) 6
- Pedicel distinctly shorter than first flagellar segment. Third segment of gaster longer, usually about as long as fourth 8
- 6 Gaster longer than head and thorax together, as about 5:4 *giraudi* (von Schlechtendal)
- Gaster about as long as head and thorax together 7
- 7 Sixth flagellar segment distinctly transverse (fig. 37). Stigmal vein making an angle of between 20° and 30° with the postmarginal vein (fig. 41) *brevicornis* (Walker)
- Sixth flagellar segment sometimes about quadrate, usually longer than wide (fig. 36). Stigmal and postmarginal veins making an angle of about 40° (fig. 40) *linearis* (Walker)



FIGS. 3-8.—Galls caused by *Tetramesa* species (not to scale): (3) *T. hyalipennis* (Walk.) on *Agropyron junceiforme*; (4) *T. hyalipennis* on *A. repens*; (5) *T. calamagrostidis* (v. Schlecht.) on *Calamagrostis epigejos*; (6) *T. eximia* (Gir.) on *C. epigejos*; (7) *T. brevicollis* (Walk.) on *Festuca rubra*; (8) *T. stipae* (De Steffani) on *Stipa tortilis* (after Hedicke).

- 8 Head in frontal view (fig. 54) extremely transverse, cheeks narrowed sharply to mouth, not at all angled. Pronotal collar transverse, more than twice as wide as long. Gaster short. Male antenna (fig. 60) with flagellar segments relatively short and laterally flattened (as in many Eurytominae); apical spine present **brevicollis** (Walker)
- Head less transverse and cheeks at least slightly, though not sharply, angled (figs. 42, 44, 63). Pronotal collar usually longer 9
- 9 Antennae (figs. 46, 47) with the six basal flagellar segments distinctly separate; sixth and seventh segments not closely associated. Hairy species with hairs of hind tibia bristle-like and clearly longer than maximum width of tibia. Pronotal spots very small or absent on dorsal surface (*crassicornis* group) 10
- Sixth and seventh flagellar segments distinct, but closely applied to each other (figs. 48–53, 92). Usually less hairy species, with hairs of hind tibia rarely longer than maximum width of tibia. Pronotal spots often well developed (*hyalipennis* group) 11
- 10 Flagellar segments extremely transverse (fig. 47); rhinaria exhibiting extreme ridge-like development. Hairs of head, thorax and legs very well developed. Short species with propodeum sharply declivous **crassicornis** (Walker)
- Flagellar segments clearly longer than wide (fig. 46), fifth and sixth sometimes almost quadrate. Longer species, with hairs well developed; propodeum less sharply declivous **fumipennis** (Walker)
- 11 Legs short (figs. 71–2), spur of mid tibia about as long as dorsal face of basitarsus; mid basitarsus about three times as long (dorsal face) as maximum width, only about as long as or slightly longer than fifth segment, excluding claws. Hairs of scutellum short and sparsely distributed 12
- Legs longer (figs. 67–70), spur of mid tibia distinctly shorter than dorsal face of its basitarsus; mid basitarsus more than three times as long as maximum width, clearly longer than fifth segment, excluding claws 13
- 12 Gaster (fig. 77) lanceolate, almost as long as head and thorax together. Propodeum sloping evenly from metanotum (fig. 90) **airae** (von Schlechtendal)
- Gaster (fig. 74) rather globular, shorter than thorax. Propodeum sharply angled forming a dorsal shelf (fig. 91) **angustata** (Walker)
- 13 Gaster with petiole between slightly less than three times and twice as wide as long, in dorsal view. Thorax usually rather sparsely haired 14
- Gaster with petiole shorter, more than four times as wide as long, often hardly visible in dorsal view. Thorax thickly clothed with long hairs 15
- 14 Longer narrow species; gaster (fig. 75) longer than thorax. Hairs of scutellum longer and upstanding. Stigmal vein about two-fifths length of marginal vein (fig. 82). Legs predominantly dark fuscous **petiolata** (Walker)
- Shorter species; gaster (fig. 76) usually shorter than thorax. Hairs of scutellum short and adpressed to the surface. Stigmal vein slightly more than half as long as marginal (fig. 80). Legs partly bright fulvous, darker in male **hyalipennis** (Walker)
- 15 Marginal vein slightly more than twice as long as stigmal vein (fig. 79). Gaster (fig. 73) elongate, about as long as head and thorax together, at least tergites 3 to 7 with heavy alutaceous sculpture. Legs bright rufous marked; antennal scape basally rufous; venation pale testaceous; wings variably testaceous infumate. Male antennae (fig. 55) with elongate flagellar segments, thickly clothed with short hairs **calamagrostidis** (von Schlechtendal)
- Marginal vein (fig. 81) slightly less than twice as long as stigmal vein. Gaster shorter (fig. 78), only slightly longer than thorax; segments 1 to 4, at least, polished, without alutaceous sculpture dorsally. Legs extensively fuscous; venation fuscous. Male antennae (fig. 59) shorter, with sparser hairing **phleicola** (Hedicke)
- 16 Third tergite of gaster short, less than half length of second dorsally (figs. 34, 35), apically emarginate 5

- | | | |
|----|--|----|
| — | Third tergite longer, not obviously emarginate (<i>longicornis</i> group) | 17 |
| 17 | Flagellar segments elongate; fifth clearly longer than wide (figs. 92, 94, 96). Mid tibial spur usually very much shorter than dorsal length of its basitarsus (figs. 88, 89) | 18 |
| — | Flagellar segments shorter; fifth transverse or about quadrate (fig. 98). [Pronotal collar transverse, almost twice as wide as long (fig. 104).] Mid tibial spur almost as long as dorsal face of mid basitarsus (fig. 87) cornuta agg. | |
| 18 | Pronotal collar relatively elongate, about one and a half times as wide as long (fig. 103); completely testaceous in female, mostly black in male fulvicollis (Walker) | |
| — | Pronotal collar shorter, almost twice as wide as long (fig. 105); black with large pronotal spots | 19 |
| 19 | Legs extensively rufous. Antennae (fig. 92) with flagellar segments longer, anellus usually longer than wide. Face long, height to width as about 3 : 4 (fig. 101). Male antennae (fig. 93) very long . . . longicornis (Walker) | |
| — | Legs predominantly black. Antennae (fig. 94) with flagellar segments shorter; anellus transverse. Face shorter, height to width as about 5 : 7 or less (fig. 102). Male antennae shorter (fig. 95) . . . longula (Dalman) | |
| | albomaculata (Ashmead) | |

VI. CLASSIFICATION AND DESCRIPTION OF SPECIES

The species of *Tetramesa* included here fall into several more or less distinct species groups, none of which appears to warrant generic rank. The non-British species in the following list are indicated by an asterisk and full descriptions of these are not given.

angustipennis group

- T. angustipennis* (Walker)
T. filicornis (Hedicke) (?)
T. eximia (Giraud)
T. romana (Walker)*

linearis group

- T. linearis* (Walker)
T. brevicornis (Walker)
T. giraudi (von Schlechtendal)
T. schmidti (Hedicke)*

crassicornis group

- T. crassicornis* (Walker)
T. fumipennis (Walker)

hyalipennis group

- T. hyalipennis* (Walker)
T. petiolata (Walker)
T. calamagrostidis (von Schlechtendal)
T. phleicola (Hedicke)
T. brachypodis (von Schlechtendal)*
T. poae (von Schlechtendal)*
T. buccata (Thomson)*
T. schlechtendali (Hedicke)*
T. angustata (Walker)
T. airae (von Schlechtendal)
T. aciculata (von Schlechtendal)*

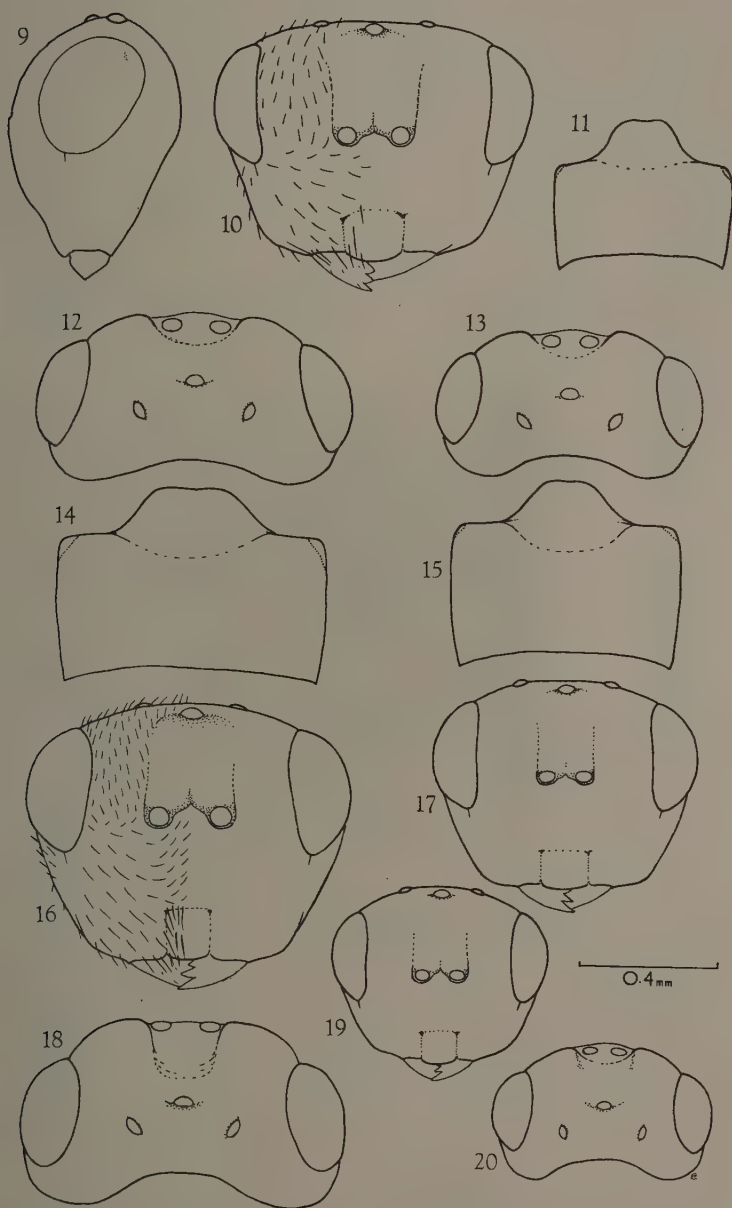
CLASSIFICATION AND DESCRIPTION OF SPECIES (cont.)

brevicollis group*T. brevicollis* (Walker)**longicornis group***T. longicornis* (Walker)*T. longula* (Dalman)*T. albomaculata* (Ashmead)*T. fulvicollis* (Walker)*T. cornuta* (Walker)*T. maculata* (Howard)**brischkei group***T. brischkei* (von Schlechtendal)***cylindrica group***T. cylindrica* (von Schlechtendal)**T. scheppigi* (von Schlechtendal)**T. stipae* (De Steffani)***incertae sedis***T. persica* (Hedicke)****Tetramesa angustipennis* (Walker) comb. nov.**1832, *Isosoma longulum* Walker (nec Dalman), *Ent. Mag.* 1: 14-15.1832, *Isosoma angustipenne* Walker, *Ent. Mag.* 1: 16.1846, *Isosoma verticillata* Walker (nec Fabricius), *List. spec. Hym. Ins. Coll. Brit. Mus.* 1, Chalc.: 11.1871, *Isosoma melanomera* Walker, *Notes Chalc.* 1: 14-15 **syn. nov.**1875, *Isosoma opaca* Thomson, *Hym. Scand.* 4: 55, **syn. nov.**1875, *Isosoma inaequalis* Thomson, *Hym. Scand.* 4: 56, **syn. nov.**1920, *Isosoma longicollis* (Hedicke), *Arch. Naturgesch.* 86 (11): 124-5, **syn. nov.**1959, *Tetramesa opaca* (Thomson), Claridge, *Ent. mon. Mag.* 95: 8.*T. angustipennis* shows extreme variation in the ratio of body length to width.

Female.—Predominantly coal-black species. Mandibles and palpi fusco-rufous; slight variable rufous marking at antero-lateral edge of pronotum (pronotal spots); tegulae and venation fuscous; disc of fore-wing variably infumate, sometimes almost completely hyaline, as hind wing; femora and tibiae basally and apically, and basal four tarsal segments, dark rufous. Maximum length about 4.2 mm.

Head, in frontal view (figs. 10, 17, 19) subquadrate; cheeks sharply angled below; antennae inserted above lower level of eyes, at position equal to about one-eighth height of eye above its lower margin; inner margins of eyes more or less parallel; antennal scrobes not margined; surface sculpture rugulose, with distinct, rather shallow umbilicate punctures; short white hairs arise from each puncture. Head, from above (figs. 12, 13, 20), varying between about 1.5 and twice as wide as long; rather gibbous between eyes, particularly in narrow specimens (fig. 20); ratio of postocellar line: ocular ocellar line (POL: OOL), measured from edges of ocelli, as about 2:1.

Malar space (fig. 9) almost as long as vertical height of eye. Antennae (fig. 26) with scape simple, tapering apically; pedicel about 1.3 times as long as wide; single anellus distinctly transverse; eight flagellar segments clearly separate, though seventh may be closely applied to eighth; no sign of club formation; proportions of flagellar segments rather variable, but first to fifth always longer than wide, sixth sometimes about quadrate; all flagellar segments rugosely sculptured and thickly sclerotised, particularly basally; rhinaria well developed, ridge-like but sparsely distributed, confined to apical half (or less) of segments one to six, but extending further basally on seven and eight, always terminating at or very near to apical margin of segments; hairs rather short and bristle-like, sparsely distributed.



FIGS. 9-20.—(9-15, 17, 19-20) Female *T. angustipennis* (Walk.): (9) head, lateral view; (10, 17, 19) the same, front view; (12, 13, 20) the same, dorsal view; (11, 14, 15) pronotum, dorsal view. (16, 18) Head of female *T. eximia* (Gir.): (16) front view; (18) dorsal view. (All to same scale.)

Thorax variable from between slightly less than twice as long as maximum width to distinctly more than twice, particularly in small specimens; pronotum similarly variable (figs. 11, 14, 15) from between slightly more to less than twice as wide as long; surface sculpture heavily alutaceous with densely distributed shallow umbilicate punctures; clothed with short hairs, little longer than maximum width of hind basitarsus. Mesepisternum sloping evenly, but slightly angled before mid coxa to form a poorly developed mesosternal shelf. Scutellum in lateral view produced back as a lamella overlying the metanotum, latter almost completely obscured in dorsal view. Propodeum well developed, variable in angle of slope, often with a well developed dorsal face; with heavy rugulose sculpture and distinctly impressed medial furrow. Foreleg with coxa about three times as long as maximum width, not reaching to level of mid coxal insertion; femur rather swollen medially, slightly shorter than tibia; tibial spur apically curved and bidentate; tarsus slightly longer than tibia; claws simple. Mid leg with coxa short; femur about three-quarters length of tibia; tibial spine distinctly shorter than basitarsus; ratio of dorsal lengths of consecutive tarsal segments from tibial insertion as approximately 9:5:4:3:6 (fig. 64). Hind leg with coxa large, about half length of femur; tibia as long as femur and trochanters together; tarsal segments all longer than those of mid leg. Fore wings (fig. 29) densely clothed with short hairs; with stigmal vein between a half and five-eighths length of marginal vein; post marginal vein variably developed, fading apically, never as long as stigmal; marginal vein variably thickened.

Gaster (fig. 22) variable in length, but about as long as thorax; petiole (first segment) rather long and in lateral view lamelliform, about 2.5 times as wide as maximum length in dorsal view, bearing distinct long hairs; second segment long, about three times as long as third in dorsal view; hair bands well developed on sixth, seventh and eighth; ovipositor sheaths slightly projecting; segments two to five, at least, glabrous and highly polished dorsally; seven and sometimes six with variably developed fine alutaceous surface sculpture.

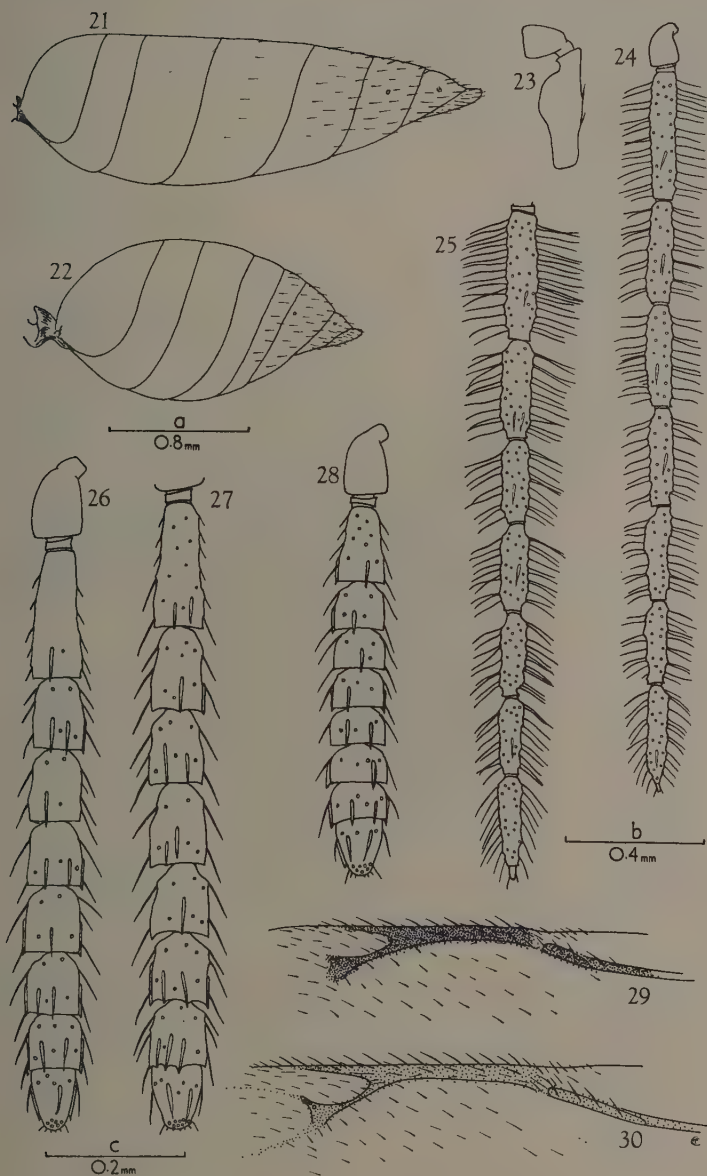
Male.—As female, but variation of body width to length even more pronounced; body usually narrower. Antennae (figs. 23, 25) longer; scape distinctly swollen ventrally and medially; flagellar segments longer, cylindrical, densely haired; seventh terminating in a short spiniform process; rhinaria sparsely distributed. Abdominal petiole longer; rather variable, about twice as long as wide; remaining tergites shorter.

T. angustipennis, though subject to extreme variation in body proportions, is distinctive and should be identifiable from the characters given in the key above.

There are five Walker specimens, all males, standing as *angustipenne* in the British Museum. One bears the label "1037", which refers to an entry in the old museum register. The appropriate entry reads "*Isosoma angustipenne* Walker Ent. Mag. 1.16.6.". This confirms that the specimen bearing the label was an early Walker specimen and, since it fits the inadequate description, has been selected as lectotype. It is a small narrow bodied specimen (for pronotum cf. fig. 11). Under *verticillata* in the British Museum there is a long series of remounted Walker specimens, of which nine males and one female I would attribute to *T. angustipennis*. Walker, in his catalogue of Chalcidoidea in the British Museum (1846), synonymised *Isosoma longulum*, *I. fumipenne* and *I. simile* under *Isosoma verticillata*. There is no doubt that the British Museum collection was re-arranged, probably by Walker himself, according to that catalogue. Thus, it would be expected that the type material of the above species would be under *verticillata*. I believe that to be so and that *I. longulum* Walk. (nec Dalman) and *I. simile* Walk. are both conspecific with *T. angustipennis* whilst *I. fumipenne* represents a distinct species (see below). The female from the above mentioned series is a large, broad specimen (for pronotum cf. fig. 14) and almost certainly represents *I. longulum* Walk. *I. simile* is probably represented by some of the narrower males (for pronotum cf. fig. 15). However, since it is not possible to be certain of this, I shall not select a lectotype.

Under *melanomera* in the British Museum, there is a single Walker specimen, a male. It fits the description and is here selected as lectotype. It is a large relatively narrow specimen (for pronotum cf. fig. 15).

I have examined the series of *Isosoma opaca* Thoms. and *I. inaequalis* Thoms. from Lund. The name *opaca* is not represented, as such, in the collection, but there



FIGS. 21-30.—(21-22) Lateral view of female gaster of: (21) *T. eximia* (Gir.); (22) *T. angustipennis* (Walk.) (to scale *a*). (23-28) Antennae, lateral view, of: (23) *T. angustipennis*, male, scape and pedicel only; (24) *T. eximia*, male, scape omitted; (25) *T. angustipennis*, male flagellum; (26) *T. angustipennis*, female, scape omitted; (27) *T. eximia*, female flagellum; (28) *T. filicornis* (Hed.) (?), female, scape omitted. (Figs. 23-25 to scale *b*; figs. 26-28 to scale *c*). (29-30) Part of fore wing of: (29) *T. angustipennis*; (30) *T. eximia*. (To scale *b*.)

is a series, one female of which bears the label "*carbonaria*", standing under *flavicollis*. It is possible that, after publication, Thomson changed the name of *opaca* to *carbonaria* in his collection since the specimen fits the description of *opaca*, and *carbonaria* appears to be only a manuscript name. Thus, I select as lectotype of *I. opaca* the above mentioned specimen, which is typical of the broader form of *T. angustipennis*. Under *I. inaequalis* there are ten card-pointed specimens, on six pins. One pin bears four card-points, the upper two carrying males and the lower two females. The uppermost female is the better specimen of the two and is here selected as lectotype. The pin bears the labels "Kgsn 28/5" and a lectotype label for the lower female, selected by Dr. M. W. R. de V. Graham. However, I have not validated that unpublished selection since the specimen is damaged, but conspecific with the new lectotype. The latter is a medium sized, rather narrow bodied specimen, very similar to that of *I. melanomera* Walk. except in sex.

The holotype of *Isosoma longicolle* Hedicke, in Berlin, is a remounted Walker specimen carrying the labels "Coll. Cameron", "*Isosoma longicolle* ♂ Hedicke", and "Type". It is a small male *T. angustipennis*.

Biology.—The larvae of *T. angustipennis* live singly in the internodes, usually just above the nodes, of the stems of *Alopecurus* species. There is no obvious gall formation but the larvae hollow out a large central cell. I have bred long series from pupae removed from the stems of *A. pratensis* and *A. geniculatus*. The adults emerge early in the spring, and I have taken specimens in the field during early April. Walker (1832) records specimens (as *longulum*) taken amongst grass during March. However, the peak of emergence appears to be during late April and early May, correlated with the main flowering growth period of *Alopecurus*. There is only one generation each year, though the larvae are fully fed by late June or early July. They pupate during the early autumn and overwinter as pupae, which, as suggested above, may be an adaptation to early emergence.

The extreme variation in body width of adult *T. angustipennis*, mentioned above, seems to be correlated, within rather wide limits, with the diameter of the internode in which the larva lives. Thus, extremely narrow forms (figs. 11, 19, 20) result from larvae which inhabited either a small stem or an upper internode of a large one. There seems to be a complete gradation from such forms to those which derive from larvae inhabiting the lower internodes of larger stems. The latter are usually larger and relatively wider in body proportions (figs. 10, 12, 14). This variation previously has been interpreted as representing more than one species (see Walker *loc. cit.* and Thomson *loc. cit.*). However, I can find no obvious break in the range of adult variation and no biological features which would suggest the presence of more than one species. An investigation by experimental breeding would be of great interest.

Material seen from ENGLAND: Buckinghamshire, Hell Coppice (Nat. Grid Ref. —SP 6110); Oakley Wood (N.G.R.—SP 6111), coll. M.F. Claridge. Northamptonshire, Salcey Forest, coll. H. W. Daltry. Oxfordshire, Otmoor (N.G.R.—SP 5514—5614), coll. M.F.C.; Wolvercote, coll. K. G. V. Smith. Warwickshire, Rugby district, coll. H.W.D.

Tetramesa filicornis (Hedicke) (?), **comb. nov.**

1920, *Isosoma filicorne* Hedicke, *Arch. Naturgesch.* 86 (11) : 119–20.

This species is closely allied to *T. angustipennis* (Walk.), but differs as follows:

Female.—Smaller, shorter species, much less variable in ratio of body width to length. Antennal pedicel and anellus clearly rufo-testaceous; legs with rather more widespread rufous marking. Maximum length about 2·8 mm.

Head rather less transverse, as in the narrower specimens of *T. angustipennis* (fig. 13). Antennae (fig. 28) with flagellar segments distinctly shorter, at least five and six clearly transverse; rhinaria as in *angustipennis*, but extending further towards base of flagellar segments.

Thorax about twice as long as maximum width; pronotum short, about or slightly less than twice as wide as long; sculpture as in *angustipennis*, hairs shorter. Legs shorter; tarsus of fore leg about as long as tibia; mid tarsus about or slightly less than three-fifths length of tibia; ratio of length of mid tarsal segments measured on dorsal surface, from basitarsus, as about 7 : 5 : 4 : 2 : 7 (fig. 66); mid tibial spur almost as long as dorsal length of its basitarsus; hind tarsus about two-thirds length of tibia, segments rather longer than those of mid tarsus.

Gaster rather variable, shorter than in *angustipennis*, about as long as thorax, petiole similarly lamelliform, slightly longer; third segment very short, about one-tenth length of second and a quarter of fourth, in dorsal view.

Male.—Not definitely known.

Tetramesa filicornis (?) is distinguished from *T. angustipennis* by its relatively shorter form, more transverse flagellar segments and shorter tarsi. Smaller specimens of *T. angustipennis* are always narrower and more slender. I have seen some males which probably belong to this species, in which the tarsi are shorter than is usual in *T. angustipennis* males, but I cannot be certain of their identity.

Isosoma filicorne Hed. was based on a single Walker male, now in Berlin. I have examined this specimen and consider that it probably represents the male of the present species. However, I cannot be sure without bred series.

Biology.—I have no breeding records for this species, but it seems to be taken usually in damp situations, often in woodland.

Material seen from: ENGLAND: Berkshire, Silwood park, coll. O. W. Richards. Oxfordshire, Otmoor (Nat. Grid Ref. SP. 5514–5614), coll. M. F. Claridge and M. W. R. de V. Graham.

Tetramesa eximia (Giraud)

? 1842, *Isosoma egesta* Walker, *Entomologist* 1 : 334–5.

1863, *Isosoma eximium* Giraud, *Verh. zool.-bot. Ges. Wien.* 13 : 1296.

1920, *Isosoma giganteum* Hedicke, *Arch. Naturgesch.* 86 (11) : 121–3.

1930, *Harmolita maxima* Tschesnokow, *Rev. russe Ent.* 24 : 191.

1959, *Tetramesa eximia* (Giraud), Claridge, *Ent. mon. Mag.* 95 : 8.

T. eximia is compared with *T. angustipennis* in the following redescription :

Female.—Large, elongate, rather slender species. Pronotal spots very small, not visible from above; coxae, trochanters and femora basally, and hind femora almost completely, dark fuscous; remainder of legs bright rufous. Fore wings with venation varying from fuscous to rufo-fuscous; spurious venation often partly visible as fuscous lines, particularly in the region of the stigma; remainder of disc variably infumate. Maximum length about 6 mm.

Head as in *angustipennis*, angles of cheeks even more acute (fig. 16); inner margins of eyes diverging below, hairs rather longer; from above (fig. 18) more gibbous between eyes and more distinctly produced back behind eyes; POL : OOL as about 5 : 3. Malar space as long or slightly longer than height of eye. Antennae (fig. 27) very similar to those of *angustipennis*; flagellar segments all tending to be longer; segments sculptured in same way.

Thorax less variable in width; pronotum slightly more than twice as wide as long; scutellum produced back, completely obscuring the metanotum from above. Propodeum less variable in slope, making an angle of about 40°–45° with the plane of the thoracic dorsum. Legs longer than in *angustipennis*; proportions similar, but tarsi relatively longer; ratio of consecutive tarsal segments of mid leg, from basitarsus, as approximately 12 : 6 : 4 : 5 : 3 : 8 (fig. 65). Fore wing (fig. 30) with marginal vein longer, rather more than twice as long as stigmal; postmarginal vein more distinct, about as long as stigmal.

Gaster (fig. 21) elongate, lanceolate; clearly longer than head and thorax together; petiole very short, about eight times as wide as long in dorsal view; third segment about half, or less than half, length of fourth, in dorsal view; segments four to seven subequal; segment two

highly polished, glabrous; segments three to eight with distinct alutaceous sculpture extending dorsally; hairs slightly developed on segment five and sometimes four also, denser on six to eight than in *angustipennis*.

Male.—As male *angustipennis*, but differing in most of the above features. Antennae (fig. 24) with flagellar segments longer and densely clothed with rather shorter hairs. Abdominal petiole shorter than in *angustipennis*, about 1.5 times as long as wide.

T. eximia is the largest British species of the genus, and is easily distinguished by the characters given in the key above. The antennae and the shape of the face place it nearer to *T. angustipennis* than to any of the other species here described.

Steffan (1956) has synonymised *Isosoma giganteum* Hedicke under *I. eximium* Giraud. Dr. Steffan has kindly compared some of my specimens with the type of *eximium* in the Museum d'Histoire Naturelle, Paris, and tells me (*in litt.*) that they are conspecific. *Harmolita maxima* (Hedicke) Tschesnokow (1930) is probably a misquotation for *giganteum*. Walker (1842) described *Isosoma egesta* from material collected by de Romand in Switzerland. I have failed to trace the type material either in London or Switzerland. From the description it is almost certainly the same as *T. eximia* and there are specimens of *eximia* standing as *egesta* in the Dale collection, Oxford University Museum. Nevertheless, I consider it better, since no type can be found, to use the Giraud name, the identity of which is certain.

Biology.—Bouček (1954) has recorded breeding *T. eximia* from stems of *Calamagrostis*. I have bred a long series from *Calamagrostis epigejos* in Britain. The larvae live in cells in the internodes of the flowering stems. Sometimes twelve or more larval cells may occur in a single internode. The presence of the larvae usually causes a barely perceptible swelling of the stem, but rarely any obvious stunting of the flower head. The larvae are fully grown by the end of the first summer and overwinter as such. They remain in the dead stems throughout the next summer and pupate during the early autumn; adults emerge during the third summer. This biennial life cycle is an unusual phenomenon in grass-feeding insects and can only be possible when the host is such a tough grass as *Calamagrostis*, the stems of which often remain standing for several years. According to Bouček (1957), *T. eximia* has an annual life cycle in Czechoslovakia. However, there is no doubt about the biennial cycle in Britain where the main parasite, *Eurytoma danuvica* Erdős, is synchronised with it (Claridge, 1959*b*). It may be that a few larvae pupate and emerge in one year, but I have not been able to produce this effect by keeping larvae in the laboratory.

Material seen from: ENGLAND: Berkshire, Wytham Wood, coll. G. R. Gradwell. Buckinghamshire, Hell Coppice (Nat. Grid Ref.—SP 6110); Oakley Wood (N.G.R.—SP 6111), coll. M. F. Claridge.

Tetramesa romana (Walker)

1873, *Isosoma romanum* Walker, *Entomologist* 6: 395–6.

1920, *Isosoma romana* Hedicke, *Arch. Naturgesch.* 86 (11): 145–6.

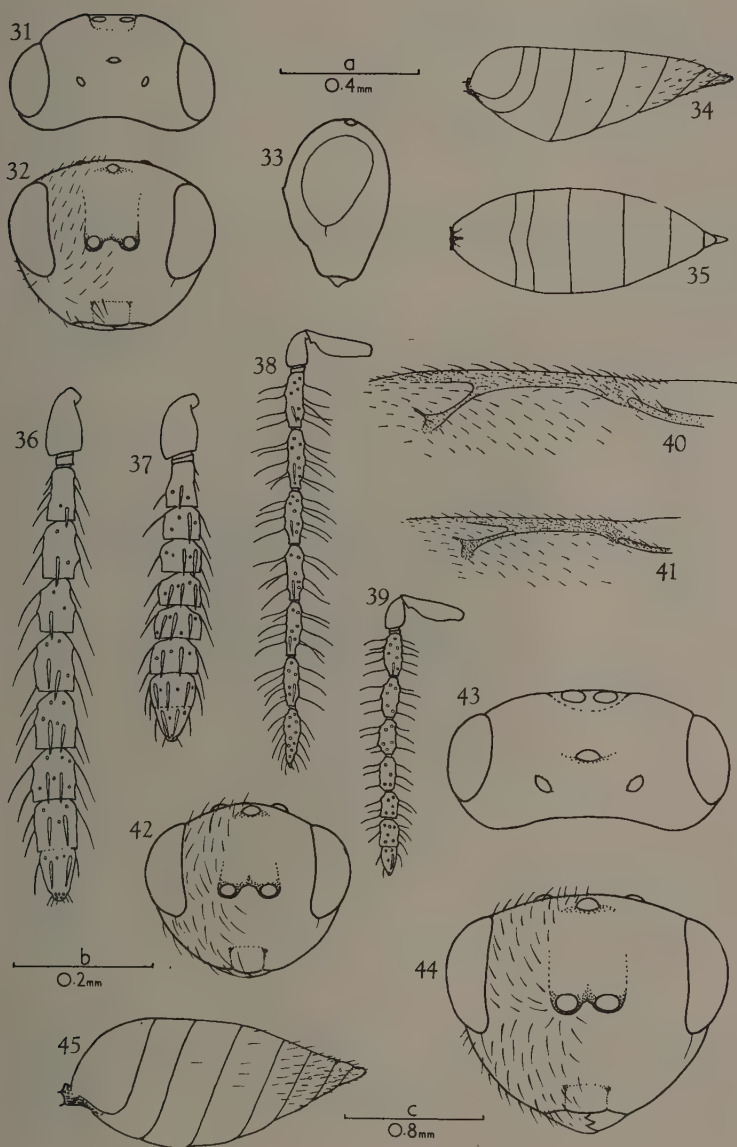
1956, *Harmolita romana* Steffan, *Bull. Soc. ent. Fr.* 61: 34–5.

1959, *Tetramesa romana* (Walker), Claridge, *Ent. mon. Mag.* 95: 12.

T. romana is a very distinct species resembling the *angustipennis* group, but differing in the unsculptured and extremely elongated antennal flagellar segments. It should probably be considered as a separate species group.

Isosoma romanum was described from Italian material and there is a single female from the Walker collection in the British Museum. That specimen is here designated as lectotype.

Biology.—*T. romana* has been recorded from Italy, southern France (Steffan, 1956) and Egypt (Alfieri, 1936), but not from northern Europe. It attacks the stems of *Arundo* spp. (in southern France, *A. donax*). There is no obvious external gall formation (see Alfieri, *l.c.*).



FIGS. 31-45.—(31-36, 38, 40) *T. linearis* (Walk.): (31) female head, dorsal view; (32) the same, front view; (33) the same, lateral view; (34) female gaster, lateral view; (35) the same, dorsal view; (36) female antenna, scape omitted; (38) male antenna; (40) part of female fore wing. (37, 39, 41) *T. brevicornis* (Walk.): (37) female antenna, scape omitted; (39) male antenna; (41) part of female fore wing. (42) *T. crassicornis* (Walk.), female head, front view. (43-45) *T. fumipennis* (Walk.): (43) female head, dorsal view; (44) the same, lateral view; (45) female gaster, lateral view. (figs. 31-33, 38-44 to scale a; figs. 36, 37 to scale b; figs. 34, 35, 45, to scale c).

Tetramesa linearis (Walker)

1832, *Isosoma lineare* Walker, *Ent. Mag.* 1 : 22.

1832, *Isosoma attenuatum* Walker, *Ent. Mag.* 1 : 22.

1891, *Isosoma agropyri* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 10.

1919, *Harmolita atlantica* Phillips and Emery, *Proc. U.S. Nat. Mus.* 55 : 461-2, **syn. nov.**

1920, *Isosoma hordei* Hedicke (*partim*) (*nec* Harris), *Arch. Naturgesch.* 86 (11) : 42-53.

1920, *Isosoma dimidiatum* Hedicke, *Arch. Naturgesch.* 86 (11) : 118-9, **syn. nov.**

1958, *Tetramesa lineare* (Walker) Claridge, *Trans. Soc. Brit. Ent.* 13 : 162.

T. linearis is compared with *T. angustipennis*, where necessary, in the following description.

Female.—Small, slender, black species. Antennal scape pale basally; pronotal spots larger, clearly visible from above; legs with femora apically and basally, fore tibiae, mid and hind tibiae apically and basally, and tarsi, pale testaceous; venation pale testaceous. Maximum length approximately 2.8 mm.

Head, from front (fig. 32) subquadrate; height to width as about 3 : 5, but variable; cheeks less sharply angled than in *angustipennis* group; eyes slightly converging ventrally; sculpturation finely rugose. Head, from above (fig. 31), distinctly gibbous between eyes; POL : OOL as approximately 2 : 1. Malar space equal to about half height of eye, rarely more (fig. 33). Antennae (fig. 36) inserted distinctly above lower level of eyes (fig. 32), scape slightly flattened and evenly dilated; pedicel laterally flattened, about a quarter length of scape; first flagellar segment about as long as, or very slightly longer than pedicel; flagellar segments rather variable, but always longer than wide; sixth flagellar segment clearly separated from seventh, but closely adpressed to it; no very clear separation of a seventh and eighth segment, though there is usually a slight external furrow; flagellar segments not distinctly sculptured, smooth between rhinaria and hair insertions; rhinaria evenly distributed, forming well developed ridges; hairs long, but sparsely distributed.

Thorax rather slender, more than twice as long as wide; pronotal collar clearly transverse, more than twice as wide as long, distinctly emarginate posteriorly; sculpture heavy alutaceous or faintly rugulose, little trace of umbilicate punctures; hairs very sparse and short; mesepisternum evenly sloping, hardly forming a mesosternal shelf. Propodeum more sharply declivous, making an angle of between 60° and 70° with the plane of the thoracic dorsum; sculpture variable, rugulose; distinct median furrow rarely present. Legs relatively longer than those of *T. angustipennis*; fore tarsus distinctly longer than tibia, as about 5 : 4. Fore wings (fig. 40) with marginal vein approximately twice as long as stigmal; angle between post marginal and stigmal veins about 40°; post marginal vein as long as or longer than stigmal vein, but rather poorly defined.

Gaster (figs. 34, 35) elongate and cylindrical; slightly longer than head and thorax together, as about 7 : 6; petiole short, hardly visible in dorsal view; second and third segments evenly and distinctly emarginate apically on dorsal surface; third segment very short, usually less than half as long as fourth, in dorsal view; segments four to seven subequal (this species is particularly prone to distortion of gastral segments on drying); very faint alutaceous sculpture variably developed on segments five to eight; hairs sparsely distributed.

Male.—As female, but scape black, venation darker. Antennae longer (fig. 38), scape only slightly dilated. Gaster with petiole longer, about one and a half times as long as wide.

T. linearis, *T. brevicornis* (Walk.), *T. giraudi* (von Schlecht.) and a number of Nearctic species, including *T. hordei* (Harris), form a natural group characterised by the typical head shape, short emarginated third gastral segment and the typical mode of gall formation.

There is a single specimen, a female, standing as *lineare* in the Walker collection, British Museum. Though not incorporated into the collection until 1904, it fits the original description and is here selected as lectotype. It bears the following labels—"Walker coll. 1904—120", a red type label, "118" or "811" and "*linearis*" in Walker's handwriting. There is no authentic specimen of *attenuatum* in the British Museum, but there is a single Walker female in the Dale Collection, Oxford University Museum. It is conspecific with *T. linearis* and is here taken as representative of *attenuatum*.

Isosoma agropyri v. Schlechtendal was described as a gall-former on the stems of *Agropyron* and it is here interpreted as being conspecific with *T. linearis*. Hedicke (1920) included it as a synonym of *Isosoma hordei* (Harris), under which name he grouped a number of closely allied forms, including *T. linearis*, but not the true *T. hordei*.

In Berlin there are two females standing as *Isosoma dimidiatum* Hedicke. They carry the labels "Deutschland", "*Isosoma dimidiatum* ♀ Hedicke" and "Type". They are both typical *T. linearis* and one is here selected as lectotype.

I have examined two paratypes, a male and a female, of *Harmolita atlantica* Phillips and Emery from the U.S. National Museum (Paratype No. 21765). They fall well within the range of variation of *T. linearis* in Britain and since the host grass and galls are identical, I have no doubt about the synonymy.

Biology.—*T. linearis* is a common gall-former in the stems of *Agropyron* species throughout the holarctic region. I have seen galls on *A. repens*, *A. pungens* and *A. junceiforme*. The galls are characteristic of the *linearis* group and consist of a collection of cells in the stem wall, and also in this species often in the surrounding leaf-sheath (Plate I). When badly infested, a stem may fail to produce a flower, but this is rare in *T. linearis*.

The larvae overwinter and pupate during the early summer. The adults, like all species attacking *Agropyron*, seem to emerge later in the summer than most other species.

In British populations, males are usually produced only rarely. Thus it is probable that *T. linearis* should be considered as an agamospecies.

Material seen from: ENGLAND: Buckinghamshire, Hell Coppice (Nat. Grid Ref.—SP 6110); Oakley Wood (N.G.R.—SP 6111), coll. M. F. Claridge. Hampshire, Portsmouth, coll. G. L. Reed. Kent, Deal (N.G.R.—TR 3755), coll. M.F.C. Sussex, Camber (N.G.R.—TQ 9518-9618), coll. M.F.C.

WALES: Glamorgan, Kenfig dunes (N.G.R.—SS 7980), coll. M.F.C.

Tetramesa brevicornis (Walker)

1832, *Isosoma brevicorne* Walker, *Ent. Mag.* 1: 16.

1891, *Isosoma depressum* von Schlechtendal (*nec* Walker), *Jber. Ver. Naturk. Zwickau* 1890: 8.

1920, *Isosoma ruschkai* Hedicke, *Arch. Naturgesch.* 86 (11): 107-10, *syn. nov.*

1924, *Isthmosoma ruschkai* Hedicke, *Zoologica*, 24: 658-9.

1958, *Tetramesa brevicorne* (Walker) Claridge, *Ent. mon. Mag.* 94: 227.

T. brevicornis is closely allied to *T. linearis* (Walk.), differing as follows:

Female.—Scape usually completely black; pronotal spots slightly smaller; leg markings less distinctly demarcated than in *linearis*; venation usually darker. Maximum length approximately 2.6 mm.

Head and thorax as in *linearis*. Antennae (fig. 37) with flagellar segments shorter, fourth and fifth always distinctly transverse. Propodeum less sharply declivous, variable. Fore wings (fig. 41) with marginal vein shorter, slightly less than twice as long as stigmal; angle between stigmal and post marginal veins more acute, between 20° and 30°. Gaster as in *linearis*.

Male.—As male *linearis*, but antennae (fig. 39) with flagellar segments very short, bearing rather shorter hairs.

T. brevicornis is closely allied to *T. linearis*, but differs in venation and antennal characters.

In the British Museum there are eight Walker specimens, all males, standing as *brevicorne*. They all fit the description and I here select one as lectotype.

There are two syntypes of *Isosoma ruschkai* Hed. in Berlin. These are conspecific with *T. brevicornis* and are what, according to Hedicke (1920), von Schlechtendal (incorrectly) called *Isosoma depressa* Walk. One of the specimens, a female, carries the labels "Halle a.s. Schlechtendal", "8", "D. v. Schlechtendal G", "*Isthmo-*

soma ruschkai m. 1920 det. Hedicke" and "Type", and is here selected as lectotype. There is also a further syntype in the British Museum.

Biology.—*T. brevicornis* is a gall-former in the stems of some *Festuca* species. I have bred specimens from *F. rubra* and *F. ovina* agg. The galls (Plate I) are similar to those of *T. linearis*, but never seem to affect the leaf-sheaths.

The larvae pupate during late summer of the first year and overwinter as mature pupae. Adults emerge early during the following spring, and may be taken during May. Males are much commoner than in *T. linearis* and there can be little doubt that sexual reproduction occurs regularly.

Material seen from: ENGLAND: Berkshire, Cothill (Nat. Grid Ref.—SU 4699), coll. M. F. Claridge. Oxfordshire, Bald Hill (N.G.R.—SU 7295), coll. M.F.C. Sussex, Camber (N.G.R.—TQ 9518-9618), coll. M.F.C.

Tetramesa giraudi (von Schlechtendal) **comb. nov.**

1891, *Isosoma Giraudi* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 8.

? 1919, *Harmolita festucae* Phillips and Emery, *Proc. U.S. Nat. Mus.* 55 : 454-5.

1920, *Isosoma giraudi* Hedicke, *Arch. Naturgesch.* 86 (11) : 94-6.

1924, *Isthmosoma giraudi* Hedicke, *Zoologica* 24 : 657.

T. giraudi is very similar to both *T. linearis* (Walk.) and *T. brevicornis* (Walk.). Its British status is dependent on a single female, without data, in the Dale collection (Hope Dept., Oxford) and a record of the galls by Bagnall and Harrison (1928). Since I have not seen modern material of this species, I shall not attempt a re-description. However, the main characters separating *T. giraudi* from *T. linearis* seem to be its larger size and relatively longer gaster, clearly longer than the head and thorax together.

There are two specimens in Berlin, one of which, a female, carries the labels "Passendorf bei Halle a.s. Schlechtendal", "21.vi.", "D. v. Schlechtendal G.", "*Isosoma giraudi* Hedicke" and "Type". It is here selected as neotype of *Isosoma giraudi* von Schlecht.

I have seen a single female paratype (Paratype No. 21759) of *Harmolita festucae* Phillips and Emery from the U.S. National Museum, Washington, which agrees with the above mentioned specimens of *T. giraudi* but I hesitate to give definite synonymy without further material both from Europe and North America.

Biology.—*T. giraudi* has been recorded from stems of *Festuca gigantea*, where it is stated to form inconspicuous galls. *Harmolita festucae* is recorded as attacking *Festuca* species in North America (Phillips and Emery, 1919).

Tetramesa schmidtii (Hedicke) **comb. nov.**

1920, *Isosoma schmidtii* Hedicke, *Arch. Naturgesch.* 86 (11) : 115-6.

1924, *Isthmosoma schmidtii* Hedicke, *Zoologica* 24 : 655-6.

There is a single female, which should be considered as the holotype, standing under this name in Berlin. It is very closely allied to *T. brevicornis* (Walk.) and from the one specimen I cannot separate them.

Biology.—Hedicke (1920) records *T. schmidtii* as a gall-former in the stems of *Corynephorus canescens* and (1924) figures the galls. I have not seen recent material. Since it is so similar to *T. brevicornis*, carefully bred series are required for the discovery of reliable specific characters.

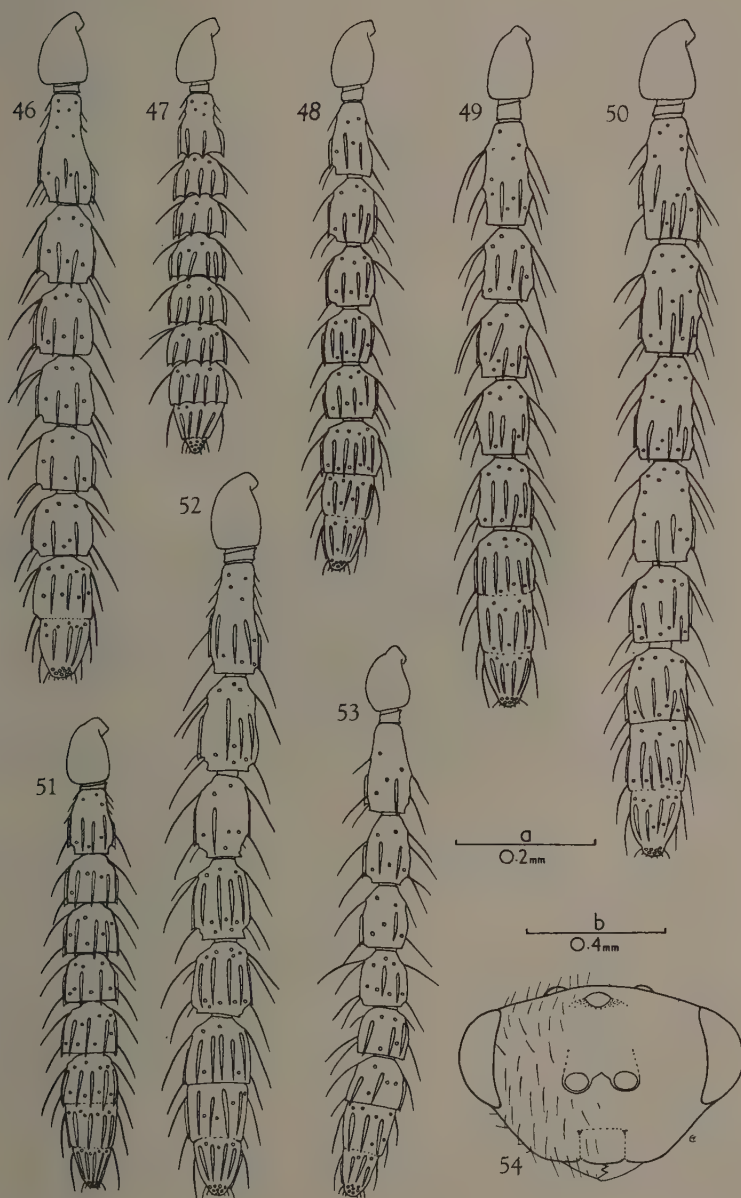
Tetramesa crassicornis (Walker)

1832, *Isosoma crassicorne* Walker, *Ent. Mag.* 1 : 15.

1848, *Tetramesa iarbua* Walker, *List spec. Hym. ins. coll. Brit. Mus.* 1, *Chalc.* : 154.

1958, *Tetramesa crassicorne* (Walker) Claridge, *Ent. mon. Mag.* 94 : 84.

I have previously redescribed and designated the lectotype of *T. crassicornis* (1958). No further description will be given here.



FIGS. 46-54.—(46-53) Female antenna, scape omitted, of: (46) *T. fumipennis* (Walk.); (47) *T. crassicornis* (Walk.); (48) *T. phleicola* (Hed.); (49) *T. hyalipennis* (Walk.); (50) *T. calamagrostidis* (v. Schlecht.); (51) *T. brevicollis* (Walk.); (52) *T. petiolata* (Walk.); (53) *T. airae* (v. Schlecht.). (To scale a). (54) Head, front view, of *T. brevicollis*, female. (To scale b.)

T. crassicornis is a distinct species, superficially resembling *T. filicornis* (Hed.) (?) in its short body form. However, it is easily distinguished by its longer and thicker body hairs, differently shaped face (fig. 42) and the structure of its antennae (fig. 47). Of the species here described it seems to be most closely allied to *T. fumipennis* (Walk.).

Biology.—*T. crassicornis* seems to be very rare. I know only one modern specimen (Berkshire: Wytham Wood, coll. G. G. E. Scudder) and no host record.

Tetramesa fumipennis (Walker) **comb. nov.**

1832, *Isosoma fumipenne* Walker, *Ent. Mag.* 1: 15.

T. fumipennis is compared with *T. angustipennis* (Walk.) in the following re-description:

Female.—Very dark species; pronotal spots very small, legs predominantly fuscous, venation fuscous; disc of fore wing variably infumate. Maximum length about 3.4 mm.

Head, in front view (fig. 44) trapezoidal; cheeks not sharply angled, smoothly curved; hairs longer and more numerous. Head, from above (fig. 43), usually slightly gibbous between eyes, variable, POL: OOL slightly less than 2: 1. Malar space about two-thirds height of eye. Antennae (fig. 46) with six basal flagellar segments clearly separate, sixth not fused with seventh; segments sculptured between rhinaria; flagellar segments one to five clearly longer than wide, sixth usually about quadrate; rhinaria longer.

Thorax about twice as long as wide; pronotal collar about twice as wide as long; dorsally with heavy alutaceous sculpture and scattered umbilicate punctures, like *T. angustipennis*, but punctures less distinct and hairs longer and more upstanding; scutellum only partly obscuring metanotum, in dorsal view. Propodeum heavily rugulose, usually with distinct median furrow. Legs proportioned as in *angustipennis*. Fore wing with stigmal vein slightly less than two-thirds length of marginal vein; postmarginal vein about as long as stigmal.

Gaster (fig. 45) slightly shorter than head and thorax together; petiole about eight times as wide as long in dorsal view; segments four to six sparsely and variably haired, seven and eight more thickly; segments two to seven highly polished dorsally.

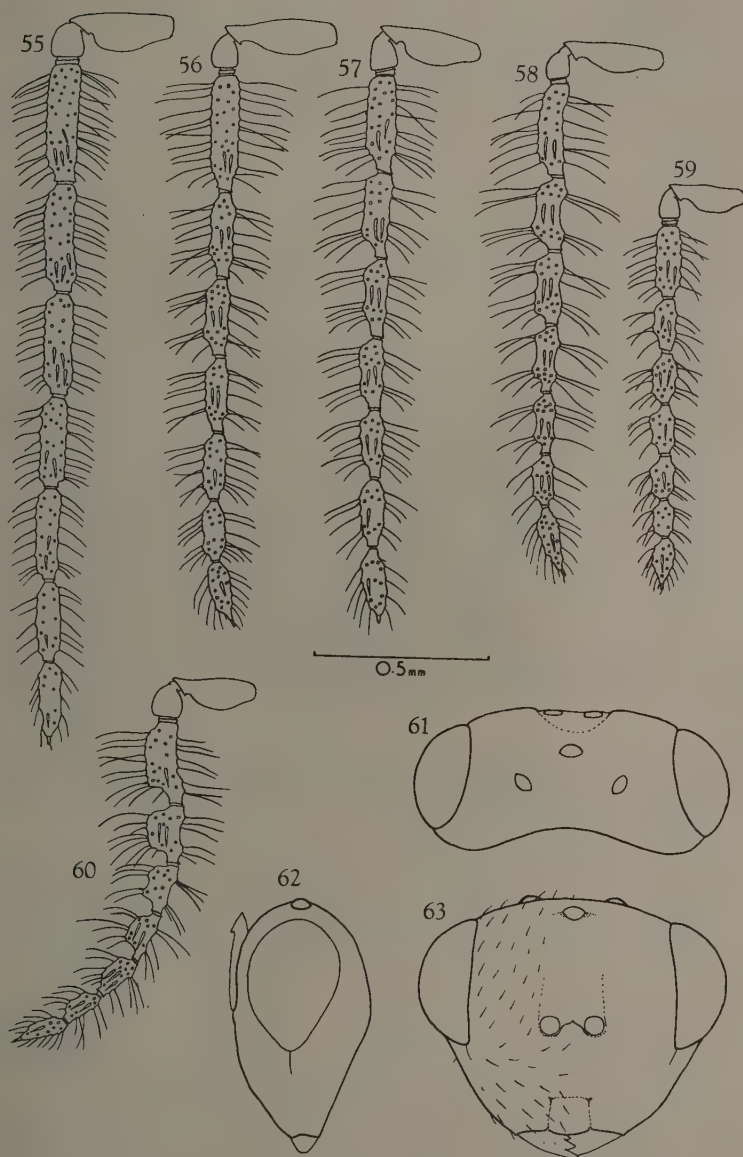
Male.—As female. Antennae (fig. 58) longer; flagellar segments slightly swollen and laterally flattened; hairs arranged in indistinct whorls, little more so than in *T. petiolata* (cf. fig. 57). Abdominal petiole almost three times as long as wide in dorsal view.

T. fumipennis is a distinct species superficially resembling the *angustipennis* group, from which it differs in the shape of the face, body hairs and fine structure of the antennae of both sexes. It is most closely allied to *T. crassicornis*.

As described above under *T. angustipennis*, the type material of *Isosoma fumipenne* Walker has been discovered in a mixed series standing as "*verticillata*" in the British Museum. There are two remounted females which are conspecific and slightly damaged. One bears the label "1024" referring to an entry in the museum catalogue, which reads "*Isosoma longula* Walk. Ent. Mag. 1.14.2". However, there are two pin holes in the label and since the specimen carrying it is unlikely to be the true *longulum* Walk. (see above), it seems probable that the label may have been changed when the whole series of "*verticillata*" was remounted. I select the other female as lectotype of *Isosoma fumipenne*.

Biology.—*T. fumipennis* is a very local species in central England. I have bred two females from larvae removed from a stem of *Alopecurus pratensis*, where they were occupying two cells together above a lower internode. The larvae did not pupate until the following spring and the adults emerged during early May. Further breeding records are required since it is always difficult to identify dead grass stems and only records which have been repeated several times can be accepted. The species occurs in the field during late May and June.

Material seen from: ENGLAND: Oxfordshire, Otmoor (Nat. Grid. Ref.—SP 5514–5614), coll. M. F. Claridge.



FIGS. 55-63.—(55-60) Male antennae of: (55) *T. calamagrostidis* (v. Schlecht.); (56) *T. hyalipennis* (Walk.); (57) *T. petiolata* (Walk.); (58) *T. fumipennis* (Walk.); (59) *T. phleicola* (Hed.); (60) *T. brevicollis* (Walk.). (61-63) Female head of *T. hyalipennis*: (61) dorsal view; (62) lateral view; (63) front view. (All to same scale.)

Tetramesa hyalipennis (Walker)

1832, *Isosoma hyalipenne* Walker, *Ent. Mag.* 1 : 17.

1836, *Eurytoma pilicornis* Boheman, *K. svenska VetenskAkad. Handl.* 1836 : 246, syn. nov.

1863, *Isosoma graminicola* Giraud, *Verh. zool.-bot. Ges. Wien* 13 : 1293.

1875, *Isosoma pilicornis* Thomson, *Hym. Scand.* 4 : 56.

1920, *Isosoma hyalipenne* Hedicke, *Arch. Naturgesch.* 86 (10) : 57-65.

1924, *Isthmosoma hyalipenne* Hedicke, *Zoologica* 24 : 648-9.

1958, *Tetramesa hyalipenne* (Walker) Claridge, *Ent. mon. Mag.* 94 : 84.

T. hyalipennis is compared with *T. angustipennis*, where necessary, in the following redescription.

Female.—Predominantly black species ; pronotal spots very small and lateral, dark rufous ; female antennal scape usually rufo-testaceous, at least basally ; femora apically, tibiae basally and apically, and tarsi basally, bright rufo-testaceous, extent of fuscous marking variable, but fore tibiae often almost completely, rufous ; venation usually pale testaceous ; hairs on disc of wing pale, disc itself variably infumate. Maximum length about 3.6 mm.

Head, from in front (fig. 63), wider than high, as about 8 : 6 or 7 ; antennae inserted slightly above lower level of eyes ; cheeks only slightly angled before mouth ; surface sculpture rugulose with scattered umbilicate punctures, sometimes rather obscured. Head, from above (fig. 61), transverse, more than twice as wide as long ; POL : OOL as almost 2 : 1 ; only slightly gibbous between eyes. Malar space almost equal to height of eye (fig. 62). Antennae (fig. 49) with scape simple, not or hardly dilated medially ; pedicel about two-thirds as wide as long ; single anellus distinctly transverse, but more than half as long as wide ; five basal flagellar segments distinctly separated, sixth closely fused with seventh to form a "club" ; seventh showing distinct signs of division into two ; proportions variable, but first to fifth flagellar segments distinctly longer than wide, with long hairs ; rhinaria well developed as slight ridges, formed into rows.

Thorax more than twice as long as wide ; pronotal collar almost twice as wide as long ; pro- and mesonotum with heavy alutaceous sculpture and scattered, rather irregular, umbilicate punctures ; short hairs, about as long as the width of the hind basitarsus, emanating from the punctures, tending to be adpressed to the surface ; scutellum only partly obscuring metanotum in dorsal view ; mesepisternum as in *T. angustipennis*. Fore wings (fig. 80) with stigmal vein slightly longer than half marginal vein ; post marginal almost as long as stigmal vein, but fading apically.

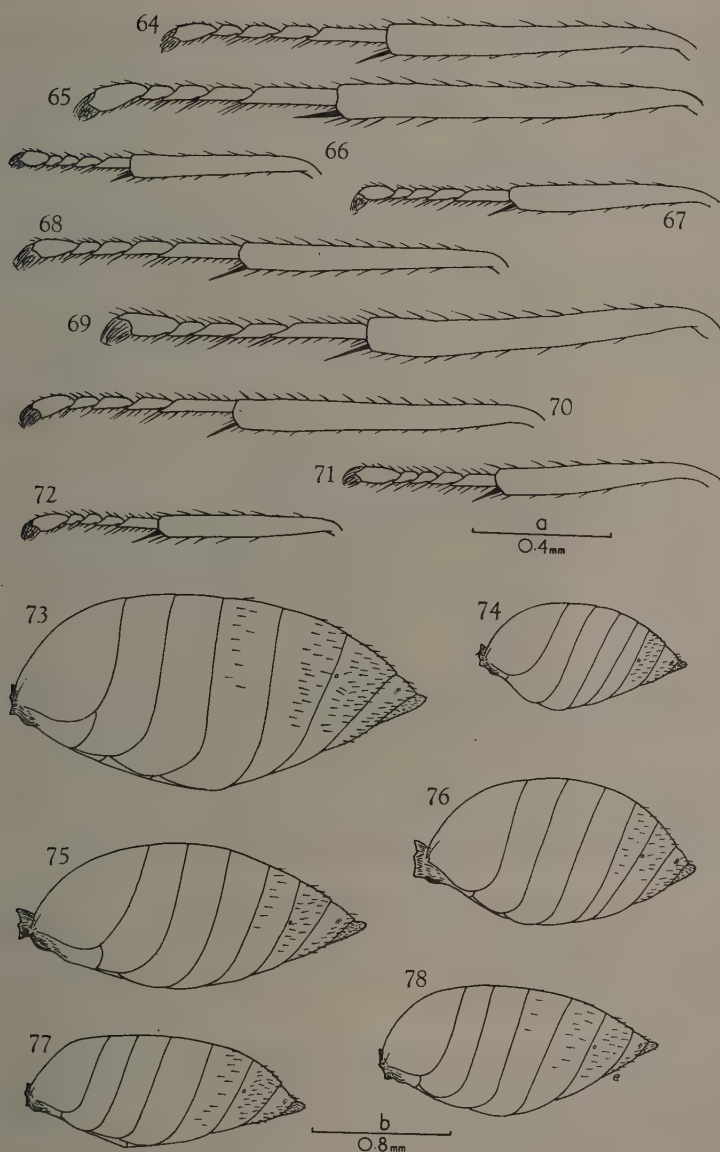
Gaster (fig. 76) usually shorter than thorax, occasionally longer ; petiole distinctly visible from above, tridentate, longest laterally where it is slightly less than three times as wide as long, in dorsal view ; second segment about twice as long as third ; third to eighth subequal ; ovipositor slightly projecting ; segments six and seven sparsely haired, eight more thickly ; traces of fine alutaceous sculpture dorsally on segments six to eight.

Male.—As female, but antennal scape black, venation and hairs of disc darker. Antennae (fig. 56) longer ; scape distinctly swollen ventrally and more or less medially ; flagellum slightly shorter than thorax ; flagellar segments longer with whorls of long hairs ; rhinaria much more sparsely distributed than in the female, but less so than in the male *angustipennis* (cf. fig. 25). Abdominal petiole longer, about twice as long as maximum width.

T. petiolata (Walk.), *T. calamagrostidis* (v. Schlecht.), *T. phleicola* (Hed.), *T. angustata* (Walk.), *T. airae* (v. Schlecht.) and *T. hyalipennis* form a natural group, based particularly on the structure of the antennae. However, *T. angustata* is more or less intermediate between the *hyalipennis* and *longicornis* groups.

After extensive searching it has not been possible to find Walker material of *Isosoma hyalipenne* in the British Museum. However, the name is well known in the literature for the insect which produces the common apical galls on *Agropyron* species. Hedicke (1920) redescribed the species using the Walker name. Since that species fits well the original description and is almost certainly the correct interpretation of *I. hyalipenne*, I accept it here.

There are two conspecific females, one of which is badly damaged, of *Eurytoma pilicornis* Boheman in Stockholm. The undamaged specimen bears the labels "V.G." [Westrogothia], "Bhn" [Boheman] and "Thoms." [Thomson], and is here



FIGS. 64-78.—(64-72) Female right mid tibia and tarsus, posterior view, of: (64) *T. angustipennis* (Walk.); (65) *T. eximia* (Gir.); (66) *T. filicornis* (Hed.) (?); (67) *T. phleicola* (Hed.); (68) *T. hyalipennis* (Walk.); (69) *T. calamagrostidis* (v. Schlecht.); (70) *T. petiolata* (Walk.); (71) *T. airae* (v. Schlecht.); (72) *T. angustata* (Walk.). (To scale a.) (73-78) Female gaster, lateral view, of: (73) *T. calamagrostidis*; (74) *T. angustata*; (75) *T. petiolata*; (76) *T. hyalipennis*; (77) *T. airae*; (78) *T. phleicola*. (To scale b.)

selected as lectotype. It is a typical though slightly teneral specimen of *T. hyalipennis*.

I have not seen the types of *I. graminicola* Giraud (1863), but there is no doubt from the original description and excellent figure of the gall that it is identical with *T. hyalipennis*.

Biology.—*T. hyalipennis* is the cause of the distinctive apical galls (figs. 3, 4) on the flowering stems of *Agropyron*. There are many published records of the species attacking marram grass, *Ammophila arenaria* (L.) Link, on sand dunes. However, Hedicke (1920) has suggested that it does not attack *Ammophila*, but instead the *Agropyron* growing amongst it. During August, 1957, I searched the sand dunes at Camber, Sussex; *Ammophila* was very abundant and growing amongst it was *Agropyron junceiforme*. The latter was heavily galled by both *T. hyalipennis* and *T. linearis* (Walk.) (see above), but, although large numbers of *Ammophila* plants were examined, no galls were discovered on them. When the galls are formed on the *Agropyron* no flowering head is produced and the stem could be mistaken for *Ammophila*. It is thus likely that the records of this species attacking marram grass are incorrect. Jansson (1954) has recorded *T. hyalipennis* (= *Harmolita pilicornis*) as making galls on *Dactylis*. This seems unlikely and may be due to an error in the determination of the grass. Thus, it seems probable that *T. hyalipennis* attacks only the species of *Agropyron*. It is a rather late emergent relative to most other species of the genus and may occur as late as July. Males normally occur in large numbers.

Adults reared from galls on *A. junceiforme* are indistinguishable from those on *A. repens*. Hedicke (1920: 65) gave the former the subspecific name *maritimum*. However they do not require a special taxonomic name and certainly not a subspecific one. The latter should be restricted to distinct allopatric forms of a species (see Mayr, 1942).

Material seen from: ENGLAND: Berkshire, Cothill (Nat. Grid Ref.—SU 4699), coll. M. F. Claridge. Buckinghamshire, Oakley Wood (N.G.R.—SP 6111), coll. M.F.C. Kent, Sittingbourne, coll. J. C. Felton. Lancashire, Freshfield, coll. R. Bailey. Northumberland, Old Hartley; Cullercoats, coll. R. R. Askew. Oxfordshire, Otmoor (N.G.R.—SP 5514-5614); Shotover Hill (N.G.R.—SP 5606), coll. M.F.C. Sussex, Camber (N.G.R.—TQ 9518-9618), coll. M.F.C. Warwickshire, Rugby district, coll. M.F.C.

WALES: Glamorgan, Kenfig dunes (N.G.R.—SS 7980), coll. M.F.C.

Tetramesa petiolata (Walker) **comb. nov.**

1832, *Isosoma petiolata* Walker, *Ent. Mag.* 1: 19.

In the following redescription only differences from *T. hyalipennis* (Walk.) are given:

Female.—Darker species; antennal scape black; fuscous areas on legs more widespread; mid and hind tibiae almost entirely fuscous; venation dark fuscous; wings more or less hyaline with dark hairing. Maximum length about 4 mm.

Head as in *hyalipennis*. Antennae (fig. 52) with sixth flagellar segment clearly differentiated from seventh, but still closely associated with it; rhinaria rather longer.

Thorax, particularly scutellum, with longer, more upstanding hairs, longer than width of hind basitarsus; scutellum in lateral profile, distinctly raised centrally; mesepisternum smoothly curved, little development of mesosternal shelf; propodeum less sharply declivous, making an angle of about 30° with the plane of the thoracic dorsum; median furrow usually well developed. Legs longer and more slender; ratio of lengths of tarsal segments of mid leg (fig. 70) as approximately 8.5:5:4:2.5:6. Fore wing (fig. 82) with stigmal vein about two-fifths length of marginal.

Gaster (fig. 75) distinctly longer than thorax; petiole longer, about twice as wide as long; remainder of gaster more lanceolate.

Male.—As female. Antennae (fig. 57) rather shorter; flagellar segments shorter. Abdominal petiole, from above, about three times as long as maximum width.

T. petiolata is distinguished from allied species by its darker coloration, narrow and elongate body form and relatively longer petiole.

In the British Museum there are two Walker males of two different species standing as *petiolata*. The second seems to fit best the inadequate original description and is here selected as lectotype.

Biology.—*T. petiolata* is common amongst *Deschampsia caespitosa* where its larvae live singly above the nodes of the flowering stems without gall formation. They pupate in early spring and adults of both sexes emerge from mid May onwards when they can be taken in suitable localities.

Material seen from: ENGLAND: Berkshire, Cothill (Nat. Grid Ref.—SU 4699), coll. M.F.C.; Bagley Wood, near Oxford, coll. H. W. Daltry. Buckinghamshire, Hell Coppice (N.G.R.—SP 6110); Oakley Wood (N.G.R.—SP 6111), coll. M.F.C. Oxfordshire, Otmoor (N.G.R.—SP 5514-5614), coll. M.F.C. Warwickshire, Waverly Wood (N.G.R.—SP 3570-3571), coll. M.F.C.

IRELAND: Co. Down, Newcastle district, coll. H. W. Daltry.

Tetramesa calamagrostidis (von Schlechtendal)

1891, *Eurytoma calamagrostidis* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890: 8.

1920, *Isosoma calamagrostidis* Hedicke, *Arch. Naturgesch.* 86 (11): 86-90.

1924, *Isthmosoma calamagrostidis* Hedicke, *Zoologica* 24: 654-5.

1959, *Tetramesa calamagrostidis* (von Schlechtendal), Claridge, *Ent. mon. Mag.* 95: 10.

In the following redescription only differences from *T. hyalipennis* (Walk.) are given.

Female.—Antennal scape rufous in female; pronotal spots rather larger and paler; femora (except basally), tibiae and tarsi (almost entirely) bright rufous; fore wings distinctly rufo-testaceous infumate, particularly centrally below marginal vein. Maximum length approximately 4.8 mm.

Head, in frontal view, slightly more transverse; from above, more gibbous; POL: OOL as about 5:4; hairs of face longer and more densely distributed. Malar space slightly less than height of eye. Antennae (fig. 50) with flagellar segments longer; basal segments always longer than in *hyalipennis*; sixth and seventh flagellar segments more clearly separated, but still forming a fairly distinct club (cf. *T. petiolata*).

Thorax clothed with longer hairs, rather more thickly than in *petiolata*; pronotal collar more transverse, slightly more than twice as wide as long; mesepisternum as in *petiolata*; propodeum heavily rugulose, usually with deep median furrow, less declivous (cf. *petiolata*). Legs rather longer, but proportions similar to those of *hyalipennis*; lengths of tarsal segments of mid-leg as approximately 10:5:4.5:3:8 (fig. 69). Fore wings (fig. 79) with stigmal vein slightly less than half as long as marginal vein.

Gaster (fig. 73) slightly longer than thorax; petiole shorter, about seven times as wide as maximum length (at sides); tergites three to eight with distinct shallow alutaceous sculpture extending dorsally; tergites six to eight with quite dense hair bands; tergite five with sparse band of hairs dorsally; scattered hairs variably developed on basal tergites.

Male.—As female, but scape black. Antennae (fig. 55) longer, bearing shorter rather more densely distributed hairs, and petiole slightly longer than in *hyalipennis*.

T. calamagrostidis is distinguished from allied species by its longer gaster, extensive red marking of the legs, and distinctly infumate wings.

There are two specimens in Berlin, one of which, a female, carries the labels "Möckerity bei Halle a.s. Schlechtendal", "D. v. Schlechtendal. G.", "*Isthmosoma* ♀ *calamagrostidis* m. 1920. Hedicke det." and "Type". This specimen is here designated neotype of *Eurytoma calamagrostidis* v. Schlecht.

From the description of the adult and the gall of *Cynips phragmitis* Schrank (1781), it is probably conspecific with *T. calamagrostidis*. However, I have been unable to trace the type material and thus the synonymy must remain doubtful.

Biology.—*T. calamagrostidis* forms distinctive galls in the stems of *Calamagrostis* species, particularly *C. epigejos* in Britain (fig. 5). Numbers of larval cells occur together above the stem nodes and cause stunting in the growth of the upper internodes and in flower development. Infested plants are thus easily identified by their very short and thickened stems, which may not rise much above the undergrowth formed by the dense leaves of the grass.

The larvae pupate during early spring and adults emerge during May and June. This species seems to occur in most localities where the host grass is present.

Material seen from: ENGLAND: Berkshire, Wytham Wood, coll. G. R. Gradwell; Cothill (Nat. Grid. Ref.—SU 4699), coll. M.F.C. Buckinghamshire, Hell Coppice (N.G.R.—SP 6110); Oakley Wood (N.G.R.—SP 6111), coll. M.F.C. Northamptonshire, Salcey Forest (N.G.R.—SP 7950), coll. M.F.C. Warwickshire, Waverly Wood (N.G.R.—SP 3570-3571), coll. M.F.C. Yorkshire, Doncaster, coll. A. Dalman.

Tetramesa phleicola (Hedicke) **comb. nov.**

1920, *Isosoma phleicola* Hedicke, *Arch. Naturgesch.* 86 (11): 100-2.

1924, *Isthmosoma phleicola* Hedicke, *Zoologica* 24: 661-2.

T. phleicola is compared with *T. hyalipennis* (Walk.) in the following redescription.

Female.—Dark rather hairy species; antennal scape black; pronotal spots slightly larger, usually visible from above; wings hyaline or basally slightly infumate; venation fusco-testaceous. Maximum length approximately 3.4 mm.

Head as in *hyalipennis*, but surface hairs longer. Antennae (fig. 48) with pedicel about four-fifths length of first flagellar segment; flagellar segments shorter, fifth almost quadrate to slightly transverse; sixth closely associated with seventh, but not completely fused (cf. *T. petiolata*).

Thorax slightly less than twice as long as wide; propodeum not sloping evenly, but with slight dorsal face, ventrally making an angle of about 50° with the plane of the thoracic dorsum; mesepisternum as in *hyalipennis*; hairs, particularly of scutellum, longer and more upstanding. Legs rather shorter; ratio of lengths of dorsal faces of mid tarsal segments as about 6:4:3:2:5 (fig. 67). Fore wing (fig. 81) with marginal vein shorter; marginal vein to stigmal as about 5:3.

Gaster (fig. 78) slightly longer than thorax; more lanceolate; petiole very short, about seven to eight times as wide as long, in dorsal view; slight hairing on tergite five, thicker on six, seven and eight.

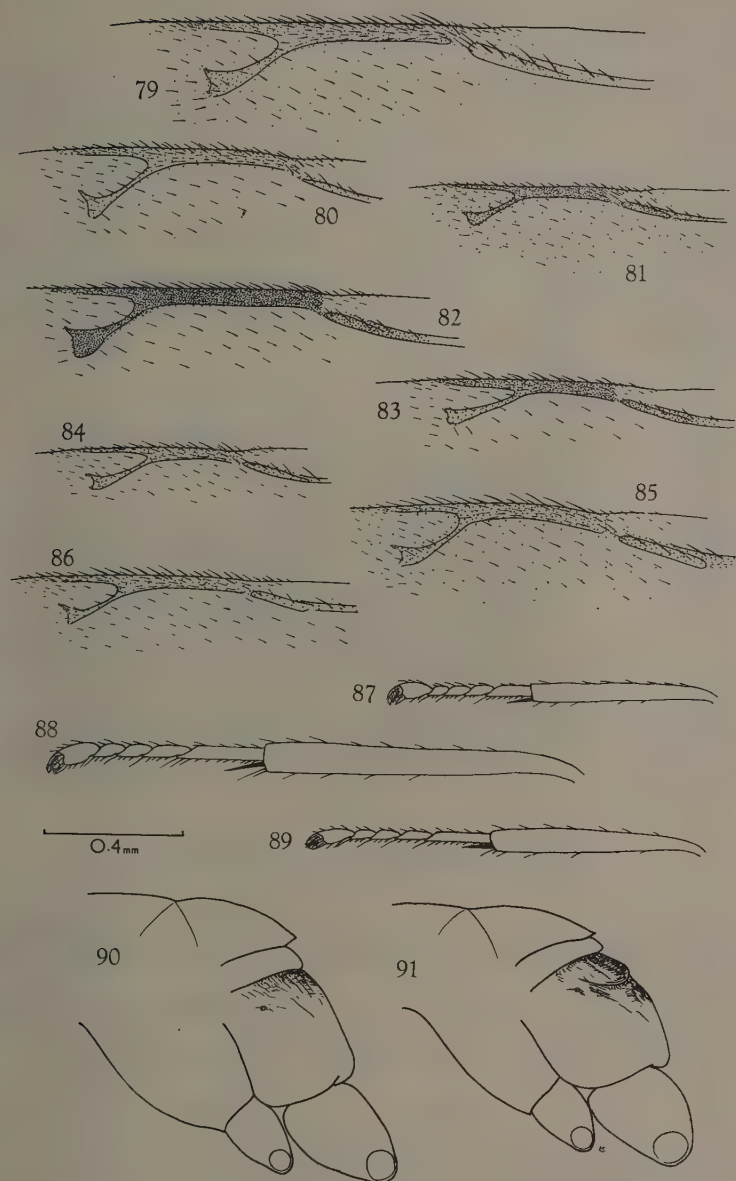
Male.—As female, but venation darker. Antennal segments shorter (fig. 59) than in *hyalipennis*.

T. phleicola differs from allied species in its darker coloration and longer body hairs. Small specimens may be confused with *T. angustata* (Walk.).

There are two syntypes in Berlin, one of which, a female, is here selected as lectotype. It carries the labels "Grünburg i. Schl. x. 1911 H. Schmidt", "*Isthmosoma phleicola* m. typ. ♀ 1920 Hedicke det.", and "Type".

Biology.—*T. phleicola* forms distinct but rather inconspicuous galls in the upper internodes of *Phleum* species. I have bred a series from galls on *P. pratense*. The galls are the result of extreme stunting of the upper internodes, somewhat similar to those of *T. calamagrostidis*. The flower head is often deformed and sometimes may not produce seed.

This species seems to be extremely localised in Britain and I have only obtained it from one locality: Oxfordshire, Otmoor (Nat. Grid Ref.—SP 5514-5614), where it was abundant in a short lane during 1957 and 1958.



FIGS. 79-91.—(79-86) Part of leading edge of fore wing of female of: (79) *T. calamagrostidis* (v. Schlecht.); (80) *T. hyalipennis* (Walk.); (81) *T. phleicola* (Hed.); (82) *T. petiolata* (Walk.); (83) *T. airae* (v. Schlecht.); (84) *T. albomaculata* (Ashm.); (85) *T. longicornis* (Walk.); (86) *T. fulvicollis* (Walk.). (87-89) Female right mid tibia and tarsus, posterior view, of: (87) *T. cornuta* (Walk.); (88) *T. longicornis*; (89) *T. fulvicollis*. (90-91) Female propodeum, lateral view, of: (90) *T. airae*; (91) *T. angustata* (Walk.). (All to same scale.)

Tetramesa brachypodii (von Schlechtendal) **comb. nov.**

1891, *Isosoma brachypodii* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 7.

1920, *Isosoma brachypodii* Hedicke, *Arch. Naturgesch.* 86 (11) : 83-5.

1924, *Isthmosoma brachypodii* Hedicke, *Zoologica* 24 : 653-4.

T. brachypodii is closely allied to *T. hyalipennis*. From the type material it appears to differ in its generally darker coloration, longer gaster with shorter petiole, more extensive pronotal spots, and finer thoracic surface sculpture with very little indication of umbilicate punctures. It thus resembles *T. phleicola*, but differs particularly in the much sparser and shorter hairs of the head and thorax.

There are two females in Berlin, both damaged and without antennae. One carries the labels "6", "*Isosoma Brachypodii* Brachyp. pinat. Danzig", "D. v. Schlechtendal G.", "*Isthmosoma brachypodii* ♂ m. 1920 Hedicke det.", and "Type". I designate that specimen as neotype of *Isosoma brachypodii* v. Schlecht.

Biology.—Hedicke (1924) has recorded this species from galls in stems of *Brachypodium pinnatum* and *B. sylvaticum*.

Tetramesa poae (von Schlechtendal) **comb. nov.**

1891, *Isosoma poae* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 9.

1920, *Isosoma poicola* Hedicke, *Arch. Naturgesch.* 86 (11) : 102-4.

1924, *Isthmosoma poicola* Hedicke, *Zoologica* 24 : 662.

T. poae is very close to *T. hyalipennis* but differs in its rather shorter abdominal petiole and darker general coloration. I have seen no certain modern material with which to make detailed comparison.

In Berlin there are two specimens, a male and a female, labelled *poicola*. The female carries the labels "Zwickau Schlechtendal", "7. 6/4 II.", "D. v. Schlechtendal G.", "*Isthmosoma poicola* m. typ. 1920 Hedicke det.", and "Type". This specimen I here designate as both the neotype of *Isosoma poae* v. Schlecht. and the lectotype of *Isosoma poicola* Hed.

Biology.—Hedicke (1924) figures galls on *Poa nemoralis*. I have seen no bred specimens from Britain, but Bagnall and Harrison (1928) have attributed galls on *P. nemoralis* to this species.

Tetramesa buccata (Thomson) **comb. nov.**

1875, *Isosoma buccata* Thomson, *Hym. Scand.* 4 : 55.

T. buccata closely resembles *T. brachypodii* and they are probably conspecific, but I hesitate to confirm the synonymy only by comparison of type material and without adequate series.

There are five specimens standing as *buccata* in Lund. The first carries the labels "102" and "*buccata*", and is here selected as lectotype. Of the remaining four specimens, three, two males and a female, appear to be conspecific.

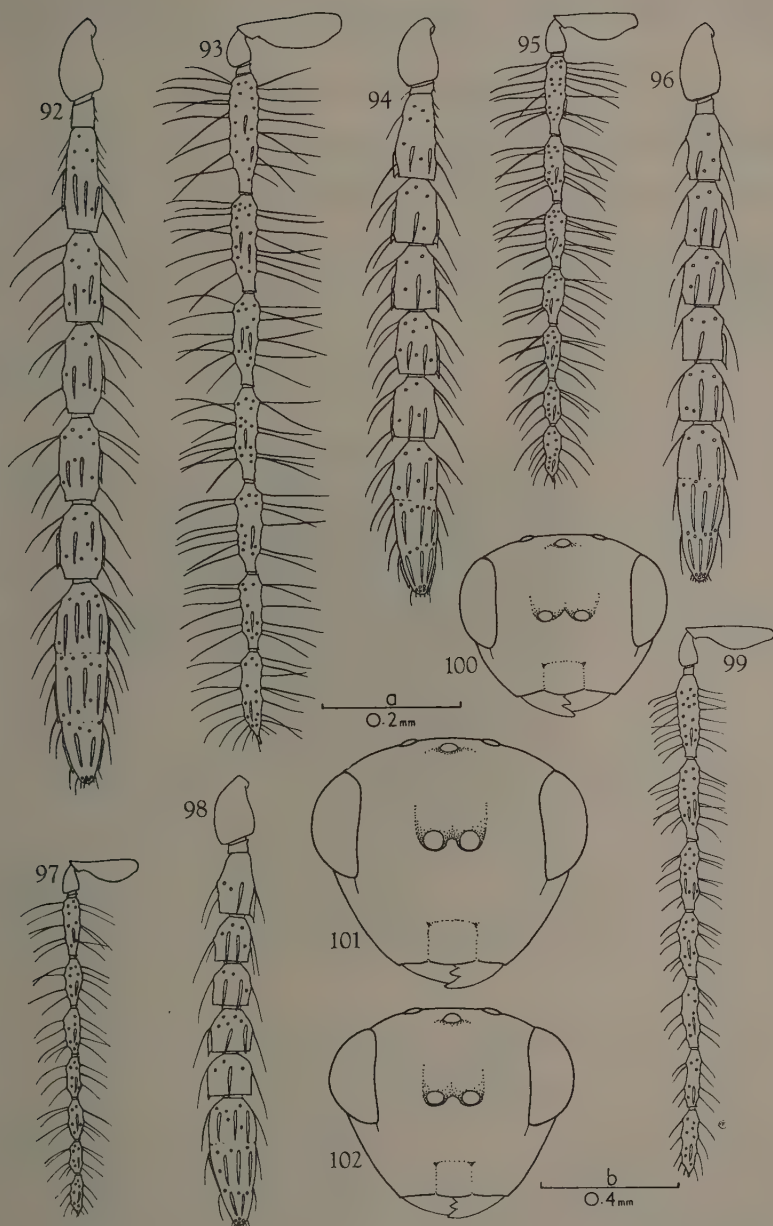
Tetramesa schlechtendali (Hedicke) **comb. nov.**

1920, *Isosoma schlechtendali* Hedicke, *Arch. Naturgesch.* 86 (11) : 113-5.

1924, *Isthmosoma schlechtendali* Hedicke, *Zoologica* 24 : 660.

T. schlechtendali would probably run to *T. hyalipennis* in the above key (p. 182). It appears to differ from that species in its smaller size and shorter gaster. However, the type material is in poor condition and is not adequate for even a preliminary comparison.

There are two specimens, a male and a female, in Berlin. Both are badly damaged. The female carries the labels "Nittritz (Schles.) Hellwig V. 1900", "D. v. Schlechtendal G.", and "Type".



FIGS. 92-102.—(92, 94, 96, 98) Female antenna, scape omitted, of: (92) *T. longicornis* (Walk.); (94) *T. longula* (Dalm.); (96) *T. fulvicollis* (Walk.); (98) *T. cornuta* (Walk.). (To scale a.) (93, 95, 97, 99). Male antenna of: (93) *T. longicornis*; (95) *T. longula*; (97) *T. cornuta*; (99) *T. fulvicollis*. (To scale b.) (100-102) Female head, front view, of: (100) *T. fulvicollis*; (101) *T. longicornis*; (102) *T. longula*. (To scale b.)

tendal G.", "*Isthmosoma schlechtendali* m. typ. 1920 Hedicke det." and "Type", and is here selected as lectotype.

Biology.—Hedicke (1924) figured galls caused by this species in stems of *Koeleria glauca*.

Tetramesa angustata (Walker) **comb. nov.**

1832, *Isosoma angustatum* Walker, *Ent. Mag.* 1 : 20.

1836, *Eurytoma guttula* Boheman, *K. svenska VetenskAkad. Handl.* 1835 : 250-1, **syn. nov.**

T. angustata is compared with *T. hyalipennis* (Walk.) in the following redescription :

Female.—Antennae with scape sometimes pale basally, rarely totally pale ; pronotal spots larger, distinctly visible in dorsal view, legs variable in marking, usually less brightly coloured than in *hyalipennis* ; fore wings with dark hairs ; venation variably fusco-testaceous. Maximum length approximately 2.6 mm.

Head, in front view, with ratio of width to height as about 6 : 5 ; from above, rather more gibbous between eyes ; hairs sparser and sculpture finer. Antennae with flagellar segments distinctly shorter ; fifth segment about quadrate or slightly transverse ; sixth segment distinct but closely associated with seventh.

Thorax about twice as long as wide ; sculpture rather shallower and umbilicate puncturation very irregular, sometimes almost obsolete ; hairs rather sparse ; propodeum with a slight dorsal face (fig. 91) before sloping away to petiole at an angle of about 45° to the plane of the thoracic dorsum ; median furrow usually present, general surface sculpturing very variable. Legs shorter ; mid tibial spur about as long as dorsal face of basitarsus ; ratio of lengths of dorsal faces of mid tarsal segments as about 4.5 : 3 : 2 : 1.5 : 5 (fig. 72). Fore wings with stigmal vein slightly more than half as long as marginal vein.

Gaster (fig. 74) rather shorter than thorax ; petiole shorter, about four times as wide as long, or less, in dorsal view.

Male.—As female, but scape always black. Antennae as in *T. phleicola*. Petiole about twice as long as wide.

T. angustata is the smallest species of the *hyalipennis* group and is in some respects intermediate between it and the *longicornis* group. It is probable that more than one species is included here under *angustata*, but no reliable characters have been found upon which splitting could be based.

There are at least ten Walker specimens of *T. angustata* scattered through the collections in the British Museum. Under *Isosoma angustatum* there are two females bearing labels "1026" which refer to an entry in the museum catalogue ; this reads "*Isosoma angustatum* Walker's Ent. Mag. 1.20.18." One of these specimens has been provisionally selected as lectotype by Dr. Graham. That selection is here validated.

There are two specimens of *Eurytoma guttula*, a male and a female, in the Boheman collection, Stockholm. The female bears the labels "Sm" [Småland], "Bhn" [Boheman] and "*guttula*". Its antennae are broken but it fits well the description and is here selected as lectotype. I cannot separate it from *T. angustata*.

Biology.—I have no host record for this common "species". There seem to be two distinct generations, one in May and June and one in late July and August. There are slight differences between the broods, but nothing that convinces me that there is more than one species involved. The females with pale scapes seem to be commoner in the second generation. Breeding work is needed with this species or species aggregate.

Material seen from : ENGLAND : Buckinghamshire, Oakley Wood (Nat. Grid. Ref.—SP 6111), coll. M. F. Claridge. Northamptonshire, Salcey Forest, coll. H. W. Daltry. Oxfordshire, Otmoor (N.G.R.—SP5514-5614), coll. M.F.C. Warwickshire, Rugby district, coll. H.W.D.

Tetramesa airae (von Schlechtendal)

- 1891, *Isosoma airae* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 7.
 1920, *Isosoma ruebsaameni* Hedicke, *Arch. Naturgesch.* 86 (11) : 104-7.
 1924, *Isthmosoma ruebsaameni* Hedicke, *Zoologica* 24 : 652-3.
 1959, *Tetramesa airae* (von Schlechtendal), Claridge, *Ent. mon. Mag.* 95 : 10.

T. airae differs from *T. angustata* (Walk.) as follows :

Female.—Antennal scape never pale marked ; legs rather more brightly marked ; venation variably pale fusco-testaceous. Maximum length approximately 3.2 mm.

Head as in *angustata*, but cheeks more narrowed towards mouth. Antennae (fig. 53) with flagellar segments rather longer than wide, sometimes about quadrate.

Thorax with more evenly distributed shallow umbilicate punctures ; hairs more densely distributed and tending to be adpressed to surface. Propodeum, in lateral view (fig. 90), sloping evenly and almost directly to petiole, little development of dorsal surface, sculpture variable but never heavily rugulose. Legs short as in *angustata* (fig. 71). Fore wings (fig. 83) with stigmal vein about two-thirds as long as marginal vein.

Gaster (fig. 77) longer, lanceolate, almost as long as head and thorax together ; petiole very short, about eight times as wide as long, in dorsal view.

Male.—Not known to me in British series.

T. airae closely resembles *T. angustata*, but is less variable and differs particularly in the shape of the gaster.

Isosoma airae was described as a gall-former on *Deschampsia* (= *Aira* auctt.) *caespitosa* (v. Schlechtendal, 1891). Hedicke (1920) rejected the trivial name *airae* and described the species as *Isosoma ruebsaameni*. However, *airae* is an available name and thus the valid one (see above).

In Berlin there is a single female which carries the labels "Tegel-Berlin Rübsaamen G", "D. v. Schlechtendal G", "*Isthmosoma ruebsaameni* m. typ. 1920 Hedicke det.", and "Type". This specimen I designate as both neotype of *Isosoma airae* v. Schlecht. and lectotype of *I. ruebsaameni* Hed.

Biology.—*T. airae* produces galling of the stems of *Deschampsia caespitosa* and accompanied stunting of the flower head, rather similarly to *T. calamagrostidis*. The galls consist of eight or more larval cells in an upper internode. Growth above the cells is reduced, but the flower head normally opens. The larvae pupate in early spring and adults emerge during late May and June. I have seen no males in British material, though Hedicke described them as occurring in central Europe. It is probable that they do occur in Britain, but at very low frequency, as in *T. linearis* (see p. 193).

Material seen from : ENGLAND : Berkshire, Cothill (Nat. Grid Ref.—SU 4699), coll. M.F.C. Kent, East Blean Wood (N.G.R.—TR 1964) ; Thornden Wood (N.G.R.—TR 1464), coll. M.F.C.

Tetramesa aciculata (von Schlechtendal) **comb. nov.**

- 1891, *Isosoma aciculatum* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 10.
 1920, *Isosoma aciculatum* Hedicke, *Arch. Naturgesch.* 86 (11) : 80-3.
 1924, *Isthmosoma aciculatum* Hedicke, *Zoologica* 24 : 663.

T. aciculata belongs to the *hyalipennis* group, but is immediately distinguished from any other species described here by its narrower, elongate body form, and particularly the gaster, which may be almost one and a half times as long as the head and thorax together. The female flagellum is relatively short.

There are five specimens, three males and two females, in Berlin. One of the females, which lacks a gaster, carries the following labels "Halle a.s. Donnersburg v. Schlechtendal", "D. v. Schlechtendal G.", "*Isthmosoma aciculatum* m. 1920 Hedicke det.", and "Type". I designate that specimen as neotype of *Isosoma*

aciculatum v. Schlecht. In the British Museum there are two further von Schlechtendal specimens.

Biology.—Hedicke (1924) records this species from galls in stems of *Stipa capillata*.

Tetramesa brevicollis (Walker) **comb. nov.**

1836, *Isosoma brevicolle* Walker, *Ent. Mag.* 4: 24.

1891, *Isosoma hieronymi* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890: 8, **syn. nov.**

1920, *Isosoma hieronymi* Hedicke, *Arch. Naturgesch.* 86 (11): 96-9.

1924, *Isthmosoma hieronymi* Hedicke, *Zoologica*, 24: 658.

T. brevicollis is compared with *T. hyalipennis* (Walk.) in the following redescription:

Female.—Dark species with pronotal spots small; tibiae predominantly fuscous; venation usually fuscous; hairs on disc of wing dark, disc itself hyaline. Maximum length about 3.2 mm.

Head, from front (fig. 54), extremely transverse, width to height as about 5:3; cheeks narrowed sharply to mouth margin; surface sculpture more or less evenly rugulose; long hairs well developed. Head from above, transverse, more than twice as wide as long; POL: OOL as about 2:1; not gibbous between eyes; antennal excavation slight. Malar space almost five-sevenths height of eye. Antennae (fig. 51) with flagellar segments shorter, fifth almost quadrate; sixth and seventh flagellar segments closely associated; rhinaria long and evenly distributed.

Thorax clothed with long hairs; slightly less than twice as long as wide; pronotal collar extremely transverse, width to length as about 8:3; sculpture rugulose with shallow umbilicate puncturation. Propodeum heavily rugulose, but median furrow usually indistinct. Legs, particularly tarsi, rather shorter than in *T. hyalipennis*. Fore wing with stigmal vein more than half as long as marginal vein; stigma usually rather larger.

Gaster slightly shorter than thorax; petiole narrow, scarcely visible in dorsal view.

Male.—As female. Antennae (fig. 60) with flagellar segments distinctly flattened laterally and hairs tending to form into whorls, as in typical *Eurytoma* species; apical spine present. Abdominal petiole about three quarters as wide as long.

The shape of face, extremely transverse pronotum and structure of the male antennae differentiate *T. brevicollis* from the other described Palaearctic species. Though probably most closely allied to the *hyalipennis* group, it seems best to separate it as a distinct species group.

There are several specimens of *T. brevicollis* scattered through the Walker collection in the British Museum. However, the species was collected by Haliday on sand hills at Port Marnock, County Dublin, Ireland (Walker, 1836). I have examined the three specimens from the Haliday collection, Dublin. They bear the labels "Pt. Mk.", "*brevicolle*" on pink paper in Haliday's handwriting, and one a label "*Isosoma brevicolle* Wlk. Lectotype M. de V. Graham". I agree with Dr. Graham's selection and here validate it.

Isosoma hieronymi v. Schlecht. was described as a gall-former on "*Festuca glauca*". There are two specimens, a male and a female, in Berlin. The female carries the labels "Schlesien aus Festuca glauca", "D. v. Schlechtendal G.", "*Isosoma hieronymi* Hedicke" and "Type", and is here designated as neotype of *Isosoma hieronymi* v. Schlecht. It is conspecific with *T. brevicollis*.

Biology.—*T. brevicollis* is a rather local gall-former on stems of *Festuca* species, particularly *F. rubra* and allied species. The galls consist of swellings of the lower internodes of flowering stems (fig. 7). A single larva inhabits the central cavity, quite unlike *T. brevicornis*, which attacks the same species of *Festuca* (see p. 194). Also, unlike *T. brevicornis*, *T. brevicollis* overwinters as a larva and does not pupate until the following spring.

T. brevicollis seems to be most frequent on coastal dunes but I have collected specimens from chalk downs and inland sandy areas.

Material seen from: ENGLAND: Berkshire, Cothill (Nat. Grid Ref.—SU 4699), coll. M. F. Claridge. Dorset, Isle of Portland, coll. A. W. Stelfox. Oxfordshire, Bald Hill (N.G.R.—SU 7295), coll. M.F.C. Sussex, Camber (N.G.R.—TQ 9518-9618), coll. M.F.C.

IRELAND: Wicklow, The Murrough, coll. A. W. Stelfox.

Tetramesa longicornis (Walker) **comb. nov.**

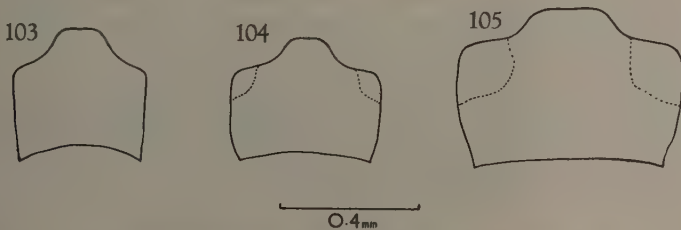
1832, *Isosoma longicorne* Walker, *Ent. Mag.* 1: 17.

1832, *Isosoma depressum* Walker, *Ent. Mag.* 1: 21-22, **syn. nov.**

1922, *Harmolita phalaridis* Phillips and Poos, *Kans. Univ. Sci. Bull.* 14 (13): 351-2, **syn. nov.**

In the following redescription *T. longicornis* is compared with *T. hyalipennis* (Walk.):

Female.—Black; pronotal spots very large (fig. 105); legs extensively bright rufous; fore and mid tibiae often almost entirely reddish; wings variably pale infumate; venation rufo-fuscous. Maximum length about 3.7 mm.



FIGS. 103-105.—Female pronotum, dorsal view, of: (103) *T. fulvicollis* (Walk.); (104) *T. cornuta* (Walk.); (105) *T. longicornis* (Walk.).

Narrow, slender species. Head, in front view (fig. 101), usually about three-quarters as high as wide; cheeks longer and less convergent; in small specimens the face is sometimes shorter. Head, from above, less transverse, about twice as wide as long; face distinctly gibbous between eyes; POL: OOL as just less than 2: 1. Malar space, in large specimens, almost as long as height of eye. Antennae (fig. 92) long, slender and clothed with long hairs; pedicel about twice as long as wide; anellus variable, but usually clearly longer than wide, sometimes about quadrate; flagellar segments one to five separate and clearly longer than wide, exact proportions variable; remaining segments more or less fused to form a club; rhinaria well developed, but sparsely distributed; hairs long.

Thorax elongate, rather longer than twice the maximum width; pronotal collar (fig. 105) transverse, width to length as about 16: 9; sculpture of pronotum alutaceous, mesonotum more rugulose, scutellum with distinct umbilicate punctures; hairs of scutellum sparse, but clearly upstanding. Propodeum making an angle of about 40° with the plane of the thoracic dorsum; heavily rugulose; median furrow variably developed. Legs long and slender; fore coxae about four times as long as maximum width, reaching well below level of mid coxal insertion; fore tarsus clearly longer than its tibia, as about 6: 5; mid tarsus between three-quarters and two-thirds length of its tibia (fig. 88); mid basitarsus clearly longer than succeeding two segments; ratio of lengths of consecutive mid tarsal segments, measured dorsally from tibial insertion, as about 10: 5: 3: 3: 6; hind tarsus about three-fifths length of its tibia. Fore wings (fig. 85) with marginal vein about twice as long as stigmal, sometimes rather longer; stigmal vein slightly shorter than post marginal.

Gaster narrow and elongate, about as long as head and thorax together; petiole between five and six times as wide as long in dorsal view; sixth and seventh segments sparsely haired.

Male.—As female, but legs and venation darker. Antennae (fig. 93) very long; scape evenly swollen; flagellum clearly longer than head and thorax together, segments cylindrical with hairs long and erect. Abdominal petiole about twice as long as wide in dorsal view.

T. longicornis is a distinct species, in typical examples differing from allied species in its long face, extensively red legs and characteristic antennae in both sexes.

In the British Museum there are two Walker specimens, both males, standing as *Isosoma longicorne*. They agree with the original description and the second is here selected as lectotype. There are four remounted females, which stood in the old collection as *Isosoma depressum*, now under *hyalipennis*. One of these fits best the description and is here selected as lectotype of *I. depressum*. It has been badly damaged, probably during remounting, but seems to be a typical female of *T. longicornis*.

I have seen a male and a female paratype of *Harmolita phalaridis* Phillips and Poos from the U.S. National Museum, Washington (Paratype No. 25473). They are identical with *T. longicornis* and, since they are biologically similar (*see below*), I have no doubt about the synonymy.

Biology.—*T. longicornis* is a common species amongst *Phalaris arundinacea*, in the internodes of which the larvae live without any obvious gall formation or stunting of growth. Phillips and Poos (1922) record *H. phalaridis* from the same grass in North America. In Britain *T. longicornis* normally has two generations each year. The larvae (fig. 1) overwinter in the dead grass stems and adults emerge during May of the following year. The next generation emerges during late June and July and again attacks *Phalaris*. Crosby (*in* Phillips and Poos, 1922) has found *H. phalaridis* also to have two generations a year in North America.

Material seen from: ENGLAND: Buckinghamshire, Oakley Wood (Nat. Grid Ref.—SP 6111), coll. M.F.C. Dorset, Dorchester, coll. H. W. Daltry. Essex, Westleton, coll. H.W.D. Oxfordshire, Otmoor (N.G.R.—SP 5514-5614), coll. M.F.C. Warwickshire, Rugby district, coll. M.F.C.

Tetramesa longula (Dalman) **comb. nov.**

1820, *Eurytoma longula* Dalman, *K. svenska VetenskAkad. Handl.* 1820 : 173, Plate 7, fig. 15.

1836, *Eurytoma longula* Boheman, *K. svenska VetenskAkad. Handl.* 1835 : 248-50.

1919, *Harmolita dactylicola* Phillips and Emery, *Proc. U.S. Nat. Mus.* 55 : 446-7, **syn. nov.**

T. longula differs from *T. longicornis* as follows :

Female.—Darker species ; legs predominantly fuscous, without reddish marking ; pronotal spots large, as in *longicornis* ; venation usually darker. Maximum length about 3.2 mm.

Head, in front view (fig. 102) more transverse, width to height as about 7 : 5 ; cheeks rather more convergent. Malar space slightly longer than two-thirds height of eye. Antennae (fig. 94) with flagellar segments shorter, but distinctly longer than wide.

Thorax and legs as in *longicornis*, but surface sculpture usually shallower and less distinct, hairs rather sparser. Marginal vein of fore wing slightly shorter than in *longicornis*.

Gaster slightly longer than head and thorax together.

Male.—As female. Antennae (fig. 95) shorter than in *longicornis*, but hairs long and erect.

T. longula is closely allied to *T. longicornis*, but differs in coloration, shape of face and antennae. There seem to be a number of sibling species close to *T. longula*, which require further study. *T. albomaculata* (Ashmead), as redescribed by Phillips and Emery (1919), is very similar (*see below*).

Dalman (1820) gave a figure of the antenna of *Eurytoma longula* and thus validated a name which otherwise would have been a *nomen nudum*. Dr. R. Malaise tells me (*in litt.*) that there are no specimens of *longula* in the Dalman collection in Stockholm. However, I have been able to examine the two specimens of *longula* from the Boheman collection from the same museum. Boheman probably made use of Dalman's material and should be taken as first reviser. I am thus basing my interpretation on the single female carrying the labels "VG" [Westrogothia], "Bhn" [Boheman], and "*longula*". It is a large typical specimen and I have no

doubt of its identity. The other specimen in the Boheman collection is a small male with broken antennae and carries a Thomson label. Thus it may not be an original specimen. Its identity is not certain.

I have seen a male and a female paratype of *Harmolita dactylicola* Phillips and Emery from the U.S. National Museum, Washington (Paratype No. 21756). They are identical with British specimens of *T. longula* and since the host plant is identical (see below), I have no doubt of the synonymy.

Biology.—The larvae of *T. longula* live singly above the nodes in stems of *Dactylis glomerata* L. Phillips and Emery (1919) record *Harmolita dactylicola* from the same grass. In Britain it seems likely that *T. longula* has two generations each season. I have not bred the summer generation, but adults may be swept during May and also during late June and July. Like *T. longicornis*, it overwinters as a larva.

Material seen from: ENGLAND: Berkshire, Cothill (Nat. Grid. Ref.—SU 4699); Wytham Wood (N.G.R.—SP 4608), coll. M.F.C. Oxfordshire, Otmoor (N.G.R.—SP 5514-5614); Bald Hill (N.G.R.—SU 7295), coll. M.F.C.

Tetramesa albomaculata (Ashmead) **comb. nov.**

1894, *Isosoma albomaculata* Ashmead, *Trans. Amer. ent. Soc.* 21: 329.

1919, *Harmolita albomaculata* Phillips and Emery, *Proc. U.S. Nat. Mus.* 55: 443-4.

T. albomaculata is closely similar to *T. longula* and cannot definitely be separated by means of morphological characters. It is usually smaller, with less distinct thoracic surface sculpture, shorter marginal vein (fig. 84) and more transverse face. These characters are not reliable for all specimens and longer bred series are required before definite key characters can be given.

Biology.—*T. albomaculata* differs from *T. longula* most obviously in its host plant. The larvae live singly above the nodes of *Phleum* species. I have bred a short series from *Phleum pratense* L., the same host as given by Phillips and Emery (1919) for North American series.

The only definite British specimens which I have seen were from Oxfordshire: Otmoor (Nat. Grid Ref.—SP 5514-5614), reared M.F.C.

Tetramesa fulvicollis (Walker)

1832, *Isosoma fulvicolle* Walker, *Ent. Mag.* 1: 21.

1834, *Isosoma flavicolle* Walker, *Ent. Mag.* 2: 153.

1875, *Isosoma flavicollis* Thomson, *Hym. Scand.* 4: 58.

1959, *Tetramesa fulvicollis* (Walker), Claridge, *Ent. mon. Mag.* 95: 11.

T. fulvicollis is compared with *T. longicornis* (Walk.) in the following redescription:

Female.—Paler marking more widespread; pronotum (fig. 103) entirely testaceous; antennal scape usually at least basally testaceous; legs extensively pale testaceous; wings variably infumate; venation testaceous. Maximum length about 2.9 mm.

Very slender, narrow species. Head, in front view (fig. 100), transverse; cheeks rounded; from above as in *longicornis*. Malar space about half height of eye. Antennae (fig. 96) slender, with segments relatively shorter than in *longicornis*; flagellar segments all clearly longer than wide.

Thorax rather longer than twice its maximum width, as about 5:4; pronotal collar (fig. 103) elongate, width to length as about 3:2; sculpture shallowly alutaceous, with little trace of umbilicate punctures on scutellum; hairs of pro- and mesonota sparse and short. Propodeum less sharply declivous, making an angle of about 30° with the plane of the thoracic dorsum. Legs long and slender as in *longicornis*; tarsi relatively longer, mid tarsus to its tibia as about 5:6; ratios of mid tarsal segments measured as in *longicornis* as about 7.5:3:2.5:2:4 (fig. 89); mid tibial spur almost half as long as its basitarsus. Fore wings (fig. 86) with stigmal vein slightly less than half as long as marginal vein.

Gaster narrow, lanceolate, almost as long as head and thorax together; petiole longer, length to width as about 2:3; remaining segments polished and sparsely haired.

Male.—As female, but pronotum black with variably developed pronotal spots: antennal scape black; venation usually darker. Antennae (fig. 99) long, slender; hairs shorter than in *longicornis*; scape evenly swollen.

T. fulvicollis is a very distinctive species in the female sex, because of its completely testaceous pronotum. The male has not previously been associated since the pronotum is black with normal pronotal spots. Occasionally the latter are very large, but I have never seen a specimen coloured as a female. The relatively elongate pronotum and slender legs and antennae should enable males of *T. fulvicollis* to be separated from those of other species.

In the British Museum there are seven Walker specimens standing as *Isosoma fulvicolle*. They are all conspecific females, one of which, labelled "Coll. Walker", is here selected as lectotype. There are no definite specimens of *I. flavicolle*, and it is probable that the syntypic series of that species is amongst the specimens of *fulvicolle*. I thus consider the two names as synonyms, as did Hedicke (1920).

Biology.—*T. fulvicollis* is common amongst *Brachypodium* species. The larvae live singly above the nodes without gall formation. Adult *T. fulvicollis* emerge during early May and a second generation normally emerges during late June and July.

Material seen from: ENGLAND: Berkshire, Bagley Wood, coll. H. W. Daltry; Cothill (Nat. Grid Ref.—SU 4699), coll. M.F.C. Buckinghamshire, Hell Coppice (N.G.R.—SP 6110); Salcey Forest (N.G.R.—SP 8051), coll. M.F.C. Oxfordshire, Bald Hill (N.G.R.—SU 7295), coll. M.F.C.

IRELAND: Co. Down, Newcastle district, coll. H. W. Daltry.

Tetramesa cornuta aggregate

T. cornuta agg. represents at least two closely similar species, *T. cornuta* (Walker) and *T. maculata* (Howard), which at present cannot be reliably separated on morphological characters.

Tetramesa cornuta (Walker) **comb. nov.**

1832, *Isosoma cornutum* Walker, *Ent. Mag.* 1: 19.

1929, *Harmolita agropyrophila* Phillips and Emery, *Proc. U.S. Nat. Mus.* 55: 450-1, **syn. nov.**

T. cornuta is closely allied to *T. fulvicollis*, but differs as follows:

Female.—Darker species; pronotum black, with pronotal spots variable, never very large (fig. 104); scape black; legs extensively fuscous marked; venation fuscous. Maximum length about 2.8 mm.

Shorter and slightly stouter species. Head as in *fulvicollis*. Antennae (fig. 98) slender, with flagellar segments shorter, fifth about quadrate.

Thorax longer than wide, as about 6:5; pronotal collar (fig. 104) more transverse, width to length as about 11:6; sculptured as *fulvicollis*, transverse lineolate reticulation distinct, giving a smooth, but not highly polished surface. Legs rather shorter, but proportioned similarly to *fulvicollis*; ratio of lengths of mid tarsal segments as about 5:3:2.5:2:4 (fig. 87); mid tibial spur clearly longer than half its basitarsus, measured dorsally. Fore wings with marginal vein slightly shorter, about twice as long as stigmal.

Gaster shorter than head and thorax together; petiole short, length to width as about 1:4; remaining segments as in *fulvicollis*.

Male.—As female. Antennae (fig. 97) distinctly shorter than in *fulvicollis*. Abdominal petiole about one and a half times as long as wide.

T. cornuta is easily distinguished from *T. fulvicollis* by the more transverse black pronotum, shorter flagellar segments, and petiole. *T. cornuta* as described above clearly includes at least two sibling species. I am convinced that *T. cornuta* itself is conspecific with *Harmolita agropyrophila* Phillips and Emery (*see below*). However, *T. maculata* (Howard), as redescribed by Phillips and Emery (1919), is very similar

and I cannot separate them definitely in swept material. *T. maculata* in typical specimens is more highly polished than *T. cornuta*, with the surface sculpture almost entirely effaced.

There are five Walker males standing as *Isosoma cornutum* in the British Museum. Two of these are conspecific and best fit the description. One is here selected as lectotype. I have examined a male and a female paratype of *Harmolita agropyrophila* from the U.S. National Museum, Washington (Paratype No. 21757). These are identical with my modern material of *T. cornuta* and the host plant is the same (see below).

Biology.—The larvae of *T. cornuta* are common inhabitants of stems of *Agropyron* species in which they live singly above the nodes, without gall formation.

The life history of *H. agropyrophila* is identical (see Phillips and Emery, *l.c.*). Adults of *T. cornuta* emerge during May and it is possible that there are normally two generations each season.

I have seen bred material of *T. cornuta* from: ENGLAND: Buckinghamshire, Oakley Wood (Nat. Grid Ref.—SP 6111), coll. M.F.C. Hampshire, Portsmouth district (N.G.R.—SU 675044), coll. G. L. Reed.

Swept specimens attributable to *T. cornuta* agg. are common in many British localities.

Tetramesa maculata (Howard) **comb. nov.**

1896, *Isosoma maculatum* Howard, *U.S. Dept. Agric. Tech. Series* 2: 15.

1919, *Harmolita maculata* Phillips and Emery, *Proc. U.S. Nat. Mus.* 55: 449–50.

As stated above, *T. maculata* is difficult to separate from *T. cornuta* in swept material. The characters of surface sculpture seem to break down in many specimens. However, the experimental work of Phillips and Emery (1919) suggests that the species is distinct. Its host plant in North America is *Bromus secalinus* L. and other species of *Bromus*. I have bred a short series from British *Bromus commutatus* Schrad. (Buckinghamshire, Oakley Wood, Nat. Grid Ref.—SP 6111). Extensive breeding work would be required to test the validity of adult characters.

Tetramesa brischkei (von Schlechtendal) **comb. nov.**

1891, *Isosoma Brischkei* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890: 8.

1920, *Isosoma brischkei* Hedicke, *Arch. Naturgesch.* 86 (11): 85–6.

1924, *Isthmosoma brischkei* Hedicke, *Zoologica* 24: 656–7.

T. brischkei resembles the *longicornis* group in the lack of heavy surface sculpture of the head and thorax, but differs from the species here described in its elongate gaster, about one and a half times as long as the head and thorax together. This very distinct species is probably best placed in a separate species group at present, particularly in view of its larval habit described below.

There is one specimen, a female, in Berlin. It carries the labels “Danzig Brischke”, “D. v. Schlechtendal G.”, “*Isthmosoma brischkei* ♀ m. 1920 Hedicke det.” and “Type”, and is here designated as neotype of *Isosoma brischkei* v. Schlecht.

Biology.—Von Schlechtendal (1891) and Hedicke (1920, 1924) record this species from stems of *Elymus arenarius*. Dr. P. Ardö, Lund, has recently sent me a long series, all females, reared from the same species of grass. The larvae appear to inhabit cells within the stem wall and not the central stem cavity. Bagnall and Harrison (1928) have recorded *T. brischkei* from Britain on the basis of galls, but I have seen no definite material and am unable to confirm their record. However, it probably will be found in suitable sand dune areas.

Tetramesa cylindrica (von Schlechtendal) **comb. nov.**

1891, *Isosoma cylindricum* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 10.

1920, *Isosoma cylindricum* Hedicke, *Arch. Naturgesch.* 86 (11) : 90-3.

1924, *Isthmosoma cylindricum* Hedicke, *Zoologica* 24 : 663-4.

T. cylindrica, *T. scheppigi* (v. Schlecht.) and *T. stipae* (De Steff.) form a very distinct species group, characterised particularly by heavy, even alutaceous surface sculpture of the head and thorax, with no umbilicate punctures, and very small pronotal spots. The group is also characterised by the production of distinctive galls on the flowers of the host grasses (fig. 8).

T. cylindrica is distinguished by its elongate and truly cylindrical female gaster, the tergites of which are covered with fine alutaceous sculpture dorsally.

There are two specimens in Berlin, a male and a female. The latter carries the labels "Donnersberg bei Halle a.s. Schlechtendal", "D. V. Schlechtendal G.", "*Isosoma cylindricum* Hedicke typ." and "Type", and is here designated as neotype of *Isosoma cylindricum* v. Schlecht. There are three further von Schlechtendal specimens in the British Museum.

Biology.—Von Schlechtendal (1891) and Hedicke (1920, 1924) record galls of this species on the flowers of *Stipa capillata*.

Tetramesa scheppigi (von Schlechtendal) **comb. nov.**

1891, *Isosoma scheppigi* von Schlechtendal, *Jber. Ver. Naturk. Zwickau* 1890 : 10.

1920, *Isosoma scheppigi* Hedicke, *Arch. Naturgesch.* 86 (11) : 110-3.

1924, *Isthmosoma scheppigi* Hedicke, *Zoologica* 24 : 664-5.

T. scheppigi differs from *T. cylindrica* in its shorter, stouter body form, and normal shaped gaster, and its extremely transverse female flagellar segments.

In Berlin there are two specimens, a male and a female. The latter carries the labels "Machn. Weinbg. Mittenwalde Scheppig", "D. v. Schlechtendal G.", "*Isthmosoma scheppigi* ♀ m. typ. 1920 Hedicke det." and "Type", and is here designated as neotype of *Isosoma scheppigi* v. Schlecht. There are also two further specimens in the British Museum.

Biology.—Hedicke (1924) figures galls caused by this species on *Stipa pennata* (fig. 8).

Tetramesa stipae (De Steffani) **comb. nov.**

1901, *Isosoma stipae* De Steffani, *Nuov. Giorn. bot. ital.* 8 : 543-44 (original not seen).

1920, *Isosoma stipae* Hedicke, *Arch. Naturgesch.* 86 (11) : 77-80.

1924, *Isthmosoma stipae* Hedicke, *Zoologica* 24 : 666.

T. stipae is closely allied to *T. scheppigi*, but appears to differ in its smaller size and longer female flagellar segments, the fourth and fifth being about quadrate.

I have not been able to examine the type material but have seen three specimens from Berlin upon which Hedicke based his interpretation of *stipae*. They carry the data label "Palermo H. Ross".

Biology.—Hedicke (1924) figures galls of this species on the flowers of *Stipa tortilis*.

Tetramesa persica (Hedicke) **comb. nov.**

1920, *Isosoma persicum* Hedicke, *Arch. Naturgesch.* 86 (11) : 99-100.

1924, *Isthmosoma persicum* Hedicke, *Zoologica* 24 : 651.

The single example of this species in Berlin is a small male and I cannot place it definitely. Further bred material is required. I include it in this paper only since the host plant is known.

The Berlin specimen carries the labels "Nehawend Persien, 2000 m. Haus-

knecht", "D. v. Schlechtendal G.", "*Isosoma persicum* Hedicke" and "Type", and is here taken as the holotype.

Biology.—Hedicke (1924) figures very distinctive galls on the stems of *Agropyron tauri* caused by this species.

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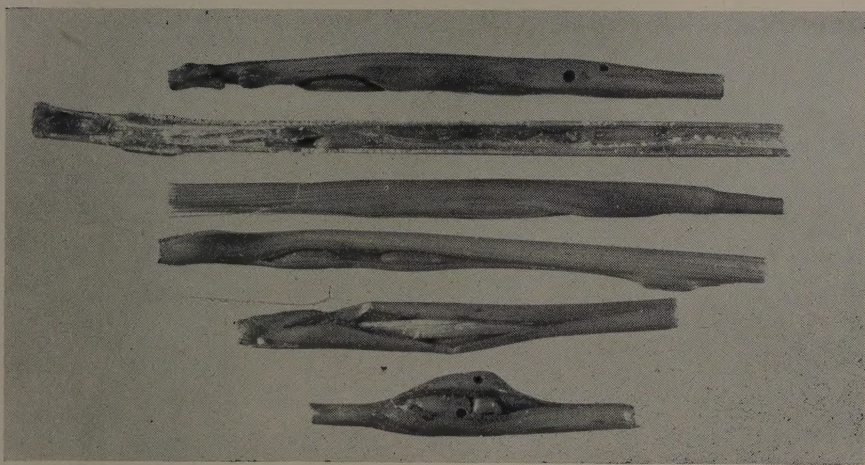
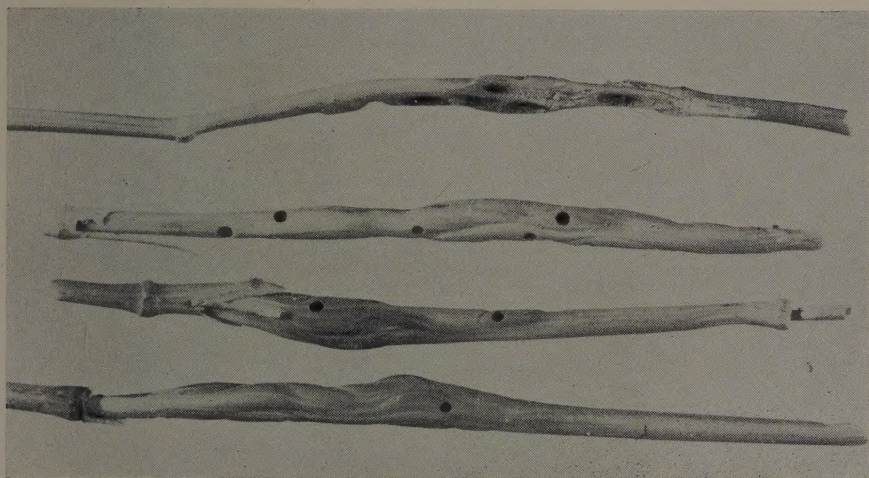
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Above : stem-galls of *Tetramesa brevicornis* (Walk.) on *Festuca rubra*. Below : stem-galls of *T. linearis* (Walk.) on *Agropyron repens* ; one opened to show larvae in cells.

